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Cold Regions Research and Engineering Laboratory

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Documenting Lessons Learned in Afghanistan Concerning Design and Construction Challenges

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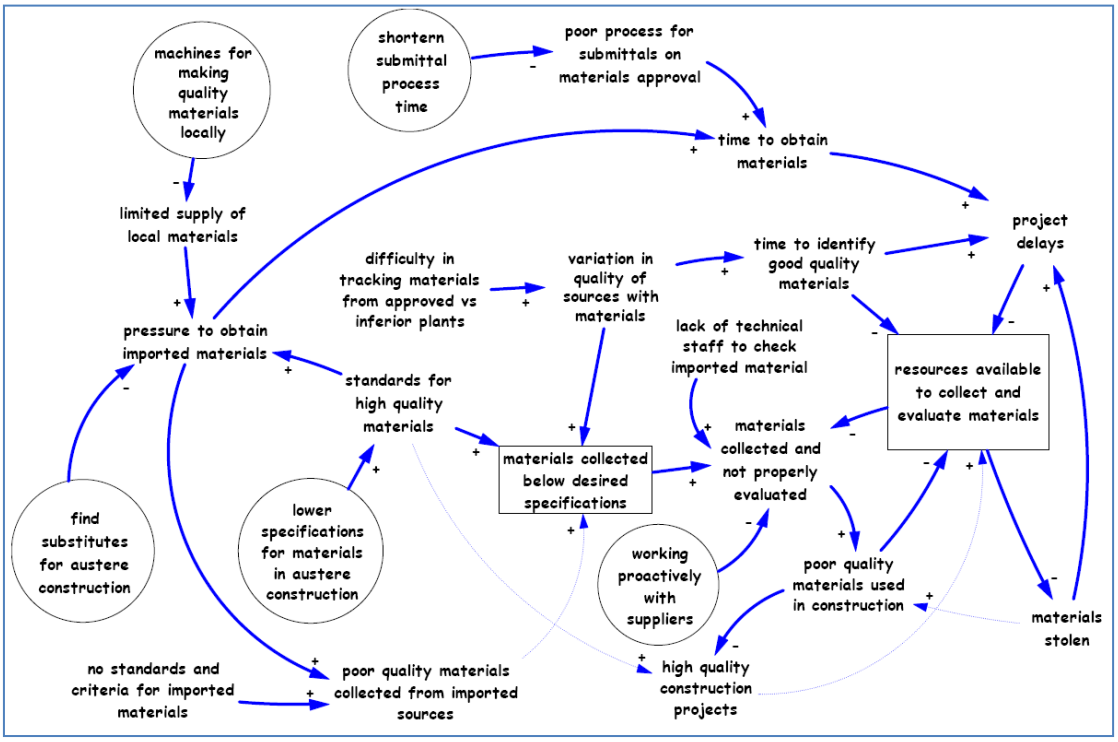

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Abstract: The U.S. military including civilian engineering and construction personnel have deployed and redeployed since the reconstruction effort began in Afghanistan. Issues with discontinuity of information occur as staff departs and new staff is assigned to the job. A significant amount of knowledge and experience accumulates and this wealth of information must be gathered for in-theater best practices. Documentations of lessons learned and experiences can be disseminated to provide insight for incoming staff, used to implement in planning processes for projects, and to avoid or minimize unintended consequences.

Experiences and lessons learned from construction projects in Afghanistan were collected from professionals, contractors, and donors, providing insight and knowledge of programming and contracting awards, planning and site assessments, designing and construction, selecting materials, ensuring quality control and quality assurance, training and education, and doing maintenance on and operation of infrastructure. The data were summarized qualitatively and analyzed quantitatively into phrases to reflect the description of each input for problems and solutions using frequency analysis, sector diagrams, and causal maps.

The responses conveyed stories telling how problems and solutions are linked. A specific solution may not only work for the original target problem but may have a secondary positive impact on another problem in the chain of issues. The data emphasized security problems during construction (i.e., stealing materials), and delays caused by security and attacks during design and construction phases. Another major problem was not accounting climatic (weather) conditions that affected design and construction. The Afghan engineers and practitioners have echoed similar concerns. In addition, the local nationals (LNs) raised the issue that there currently are no standards and criteria for imported materials, which directly affect the quality of materials being used in construction. The quality of material used varied dramatically, and negatively affected the outcome of construction projects.

Solutions have been highlighted to address: 1) the process as top priority; 2) sustainability, reflected in the capacity to develop infrastructure that the local government can maintain and operate, implementing practical standards for the end-users, and local economics, affecting current and future infrastructure development; 3) coordination among U.S., international, Afghan government and local entities; 4) and active improvement of local expertise.

This is a fact-finding report on construction challenges in Afghanistan, based on the experience and knowledge of engineers and construction personnel, contractors, and donor staff for various projects. There is a vast amount of information in this report highlighting significant ways to minimize unintended consequences. The construction challenges in Afghanistan are multidimensional and dynamic because of security and local capacity dilemmas, and because of a lack of understanding of the local culture. However, this report suggests 1) considering cultural sensitivity and attaining buy-in, and 2) developing the technical competency of the local workforce to improve construction and developing an engineering education capability by partnering with local universities. These will enhance and improve knowledge, ownership, sustainability of facilities and infrastructure, influencing both current and long-term development. Therefore, these will promote the country's security.

In addition, there several other mechanisms that should be established based on the development of this study for specific applications: 1) generating scenarios before actual facilities are planned to assess the site conditions and material influence; 2) examining the uncertainty and risks with varying criteria; 3) quantifying the performance of infrastructure using adaptable construction guidelines; and 4) assessing the impact of country or regional stability and sustainment. All of these mechanisms are essential for planning and development.

Preface

This study was conducted for the Army Study Program under project title, *Development of Best Practice Engineering Design and Construction Criteria Incorporating Local and Cultural Influence for Nangarhar Province, Afghanistan*. The technical monitor at the sponsor agency is Rob Lambert, e-mail: robin.b.lambert2@usace.army.mil.

This report was prepared by Rosa Affleck and Peter Seman, Force Projection and Sustainment Branch, Cold Regions Research and Engineering Laboratory, U.S. Army Engineer Research and Development Center; Dr. Michael Deegan, U.S. Army Corps of Engineers, Institute Water Resources; Dr. Reed Freeman, U.S. Army Engineer District, Afghanistan; and Dr. Shad Sargand, Ohio Research Institute for Transportation and the Environment, Ohio University, Athens.

Both USACE Afghanistan Engineer District–North, and Afghanistan Engineer District–South have been instrumental to this effort, promoting support from various staff to participate in providing critical information. COL Michael McCormick and COL Kevin Wilson were major proponents, along with their respective Chiefs in the Engineering and Construction Division: Rex Goodnight, Mark Jones, and Pete Perez. The collection of lessons learned data would not have been possible without the input from deployed and redeployed USACE staff, who shared their insights and experiences while working in Afghanistan. The staff included program managers; chief, program, project, and resident engineers; quality assurance and technical personnel; contracting managers and contracting officers; and officers-in-charge. The authors acknowledge Sandy Higgins for providing support during data collection and logistical planning for meetings, interviews, and construction visits during the lead author's trip to Afghanistan. Sheryl Lewis, USACE-HQ, technical guide on capacity development program is also acknowledged.

The authors thank all the valuable contributions reflecting the contractors' experience, knowledge, and construction involvement in Afghanistan. This included engineers, program managers and technical staff from Louis Berger Group and Versar, Inc. In addition, input from Afghan engineers

and contractors was greatly appreciated. Their responses highlighted the challenges from the local national perspectives and emphasized their technical growth.

Likewise, the authors give their special thanks to U.S. military engineers for providing their responses. This included the senior engineers of NATO Training Mission-Afghanistan/Combined Security Transition Command-Afghanistan (NTM-A/CSTC-A) for their input in underlining the customer's perspective; and the U.S. military mentor to the Afghan military for the Joint Regional Afghanistan Security Forces Compound, who emphasized the challenges from the end-user's perspective.

The authors sincerely thank all of the contributors, who remain anonymous, for their time in filling out the questionnaire, writing their input, and for participating in interviews. All of these contributions were significant and valuable to this effort in highlighting the construction challenges and addressing possible solutions to the issues.

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Editing was provided by our technical staff, Mark Hardenberg. Technical reviews are provided by MAJ Kyle Torster, U.S. Air Force; and Julie Kelley, Geotechnical and Structures Laboratory, U.S. Army Engineer Research and Development Center.

The report was prepared under the general supervision of James Buska, Chief, Force Projection and Sustainment Branch; Dr. Justin B. Berman, Research and Engineering Division Chief; Dr. Lance D. Hansen, Deputy Director; and Dr. Robert E. Davis, Director, CRREL.

Colonel Kevin J. Wilson was Commander and Executive Director of ERDC. Dr. Jeffery P. Holland was ERDC Director.

Acronyms and Abbreviations

AED	Afghanistan Engineer District
AEN	Afghanistan Engineer District–North
AES	Afghanistan Engineer District–South
ANA	Afghan National Army
ANP	Afghan National Police
ANSF	Afghan National Security Forces
CD	Capacity Development
CERP	Commander's Emergency Response Program
COIN	Counterinsurgency
CSTC-A	Combined Security Transition Command–Afghanistan
FAR	Federal Acquisition Regulation (United States)
GIRoA	Government of the Islamic Republic of Afghanistan
IED	Improvised Explosive Device
IJC	ISAF Joint Command
ISAF	International Security Assistance Force
JCISFA	Joint Center for International Security Force Assistance
JRAC	Joint Regional Afghanistan Security Forces Compound
LNs	Local Nationals (Afghans)
MILCON	Military Construction
MOD	Ministry of Defense (Afghanistan)
MOI	Ministry of Interior (Afghanistan)
NGO	Non-Governmental Organization
O & M	Operations and Maintenance
PE	Project Engineer
PgMP	Program Management Plan

PM	Project Manager
POC	Point of Contact
PRT	Provincial Reconstruction Team
QC & QA	Quality Control and Quality Assurance
QAR	Quality Assurance Representative
RC(N)	Regional Command–North
RC(W)	Regional Command–West
SSTR	Stability, Security, Transition, and Reconstruction
USACE	United States Army Corps of Engineers
USFOR-A	United States Forces–Afghanistan
USG	United States Government

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1 Importance

This study was intended to support the Stability, Security, Transition, and Reconstruction (SSTR) operations for the following objectives:

- The Department of Defense (DOD) mission for stability operations consists of capability, capacity, and responsibilities to ensure that the department can establish civil security and civil control, restore or provide essential services, repair critical infrastructure, and provide humanitarian assistance in theater (DOD Directive 3000.05, 2009). One of the requirements under this directive is to "gather lessons learned from stability operations and disseminate them to the DOD Components and U.S. Government (USG) agencies as appropriate." At the infrastructure execution level, construction staff and engineers supporting the STTR mission provided construction and engineering insights in Afghanistan.
- The United States Army Corps of Engineers (USACE) supports contingencies in combat, stability, and disaster operations (USACE Campaign Plan—Goal 1). As USACE executes and manages projects in a contingency environment, capabilities, knowledge, and scientific, technological and engineering expertise that are available internally (within the Corps) and externally must be applied, as execution of projects can be challenging in theater.
- USACE has embraced Capacity Development (CD) programs domestically and internationally. For STTR operations, CD is employed as ways for the local nationals to manage, operate, and maintain the new or repaired infrastructure (i.e., facilities, systems, and equipment) upon handover, without additional support from USG or other coalition partners. CD includes coaching, training, teaching, and mentoring programs aimed at strengthening public and private sector management, engineering, and technical capabilities to support self-reliance among foreign and domestic entities (USACE Capacity Development 2008). Thus, local infrastructure capability will be developed and ownership will be gained.
- The insight and lessons learned from observations of in-theater construction of infrastructure to support and provide facilities for U.S. and coalition forces are documented (Army Campaign Plan 2009). In Afg-

hanistan, the lessons learned include construction of Afghan National Police and Army facilities.

- For a global perspective, the United Nations Millennium Project has the aggressive challenge to "reverse the grinding poverty, hunger and disease affecting billions of people" worldwide (http://www.unmillenniumproject.org/). One of the goals under United Nations Millennium Development Project is to "ensure environmental sustainability by integrating the principles of sustainable development into country policies and programs." In Afghanistan, these principles are implemented when infrastructure is built with consideration to the social and environmental consequences. The goal is to minimize the loss of resources and improve the local people's health and safety and quality of life.

This study documents a new view of construction challenges in Afghanistan. This information can provide a pre-emptive approach to avoiding or minimizing unintended consequences. It can also have a positive impact by applying the above considerations while formulating requirements, plans, contracts, designs, and construction. The information can be integrated with social and cultural knowledge, as well as fundamental engineering, for infrastructure development. This applies not only in Afghanistan, but to the changing environment in other parts of the world with construction efforts for civil and military purposes.

2 Introduction and Background

Facility and infrastructure projects, both for military and civilian functions, in Afghanistan are often mission-specific to meet various strategic requirements and objectives. Coalition forces have focused their reconstruction efforts since 2002 on stabilizing Afghanistan and improving economic development. The facility and infrastructure projects include military construction (MILCON), sheltering and basing requirements for Afghan National Police and Afghan National Army (through CSTC-A), Commander's Emergency Response Program (CERP) projects, United States Agency for International Development (USAID) projects, and many others.

Recently, the Joint Center for International Security Force Assistance (JCISFA) developed guidance for U.S. military engineers (Army, Air Force, Marines, and Navy) as they support coalition forces working on reconstruction efforts in Afghanistan (JCISFA 2010). This guide provides a general overview for facilities and infrastructure project planning and decision-making at various levels: theater or strategic, operational, and tactical. The purpose is to eliminate potential negative ramifications and minimize challenges during facility and infrastructure projects. According to JCISFA (2010), some of the factors affecting the requirement decision process for theater considerations should address the following questions:

- What construction standards will engineers employ?
- What geographical and developmental factors influence a project?
- What environmental factors influence a site selection?
- What engineering force assets are available?

A generalized discussion of a project life cycle is introduced in the guidance. This also includes making decisions for prioritization of projects, the funding, the design, the construction, and the transition (turnover to owners).

In Afghanistan, numerous challenges occur at all phases and stages of a project's life cycle. These challenges affect the planning and execution of a project. For example, General Petraeus, the U.S. Commander for ISAF, acknowledged issues within the contracting arena and published a Counte-

rinsurgency (COIN) Contracting Guidance (ISAF 2010). This guidance directs commanders to develop best practices that will avoid supporting corruption-like activities in Afghanistan. Reconstruction projects that spend enormous funds are often key opportunities for improvement because they also pose dangers of unintended consequences (e.g., fueling corruption) and because of insufficient oversight.

Common U.S. construction standards are generally implemented in U.S.-led projects. The application of these standards in projects appears reasonable, but in actual practice, the standards are difficult to implement owing to limited access to technical information, including a lack of information about the local terrain and environment, and a limited understanding of local social customs (Affleck and Freeman 2010).

Construction practices used by American and international organizations rarely consider local traditional building methods and cultural norms (Malan 2010). Quality of construction is inconsistent and reoccurring themes occur. There are several factors affecting the problem: poor contractor oversight, poorly written scopes of work, corruption, and inadequate coordination between all parties involved in the reconstruction process http://www.sigar.mil/pdf/quarterlyreports/Jul2010/SIGAR_July2010.pdf. Considering the local culture and incorporating local construction methods can affect the Afghan concept of honor and are important in gaining respect from the Afghans (Affleck and Freeman 2010). Thus, cultural sensitivity should be included in the design and construction process so that Afghans assume ownership after projects are turned over to them.

Many projects in Afghanistan take place in remote or dangerous locations, affecting both military and civilian engineers, leading to difficulty in conducting thorough site assessments, planning adequately, and doing quality control. Thus, projects often suffer from a lack of oversight, leading to problems during construction that may have been avoided.

This study is focused on compiling the lessons learned from experiences and observations of construction projects in Afghanistan, with the intent to provide information and knowledge to professionals, engineering staff, program managers, and requirement developers. Some of the most common problems observed include: westernized requirements are not applicable in some cases, affecting design, construction, and materials; issues arising from not accounting for climatic (and weather) conditions; and se-

curity problems during construction (i.e., stealing materials) and delays to the schedule because of attacks and the security measures that need to be taken. Another problem is that the quality of materials used varies dramatically, which impacts the quality of the construction. All of these problems reinforced the need to examine relevant information and associated factors to develop an appropriate design matrix for construction specifications and guidance.

The lack of understanding of the influence of terrain and the physical environment (i.e., weather, and seasonal effects) on facilities and infrastructure (Affleck et al. 2011) is discussed. Guidance for the design and construction of infrastructure (e.g., pavements and retaining structures) is a must to help Afghan engineers and practitioners to develop their own design and construction standards, and to facilitate the transfer of fundamental engineering knowledge. Also discussed is the awareness that applying U.S. construction standards is sometimes impossible to achieve, especially in remote areas. The lack of a national education system, especially in engineering, physical sciences, and construction management, the security risk of conducting construction activities in combat zones, as well as the challenges of the physical environment (difficulty in oversight of projects in remote areas) are among some of the typical challenges faced (Affleck and Freeman 2010).

2.1 Physical environment

The terrain in Afghanistan is quite complex, with varied geology. Afghanistan has three distinct geographic regions: the Central Highlands, the Southern Plateau, and the Northern Plains

(http://www.gl.iit.edu/govdocs/afghanistan/TheNaturalEnvironment.html).

The Central Highlands is part of the Himalayan mountain system, with deep, narrow valleys, deserts, and some meadows. The mountain peaks are generally greater than 6560 ft (2000 m) above sea level. The two most strategically significant passes are the Shebar Pass, northwest of the capital, Kabul, and the Khyber Pass, leading to the Indian subcontinent. The Southern Plateau contains a variety of deserts and generally is infertile, except for the river deltas. The Northern Plains is mostly flat, with some fertile foothills (Peters et al. 2007).

In terms of diversity, the terrain, topography, soils, and climate are summarized in the following discussions of selected regions of Afghanistan (East View Cartographic, Inc. 2003) where some of the lessons learned in construction challenges were encountered.

2.1.1 Mazar-E-Sharif, Balkh Province (67°E–68°E, 36°40'N–37°20'N)

Mazar-E-Sharif is located in northern Afghanistan in the Province of Balkh. The terrain is relatively flat having elevations ranging from 984–1640 ft (300-500 m) with low mountains in the north east and south. The mountain ridges have crests and slopes ranging from 15-20% and are dissected by gullies and ravines. Soils over most of the plains are sandy, 16–65 ft (5-20 m) thick, and are overlain by sands, loams, and clay. This is a semi-desert environment, with sparse ground cover of grasses and low shrubs. The climate is mild in the winter months with occasional light night frost and a period of snowy weather that may exist for 10-15 days. Summer months are hot (often up to 104°F [40°C]) and dry. Precipitation can be expected 3-7 days per month.

2.1.2 Bamyan, Bamyan Province (67°E–68°E, 34°40'N–35°20'N)

Bamyan (also called Bamian) is a capital of Bamyan Province and is located in the central part of Afghanistan. The alpine terrain here has steep and rocky mountains where the elevations range from 10,830–14,760 ft (3300-4500 m), and the lower parts of the mountains are heavily dissected by shallow ravines and gullies. The river valleys are narrow and traveling on these areas is difficult even with pack animals. There are a few spacious valleys with flat sand and gravel bottoms. Soils are predominantly coarse-grained, with abundant gravel and sands. The vegetation in most of the area is considered steppe. The climate is classified as high, dry, subtropical, depending on the elevation. In the valleys below 9840 ft (3000 m), the winter is considered mild and snow is less common. However, at elevation above 9840 ft (3000 m), the winter is colder with subfreezing weather lasting from November to April. Snow can accumulate to depths up to 3 ft (1 m). Summer months are hot and dry in the valleys and cool in the higher elevations.

2.1.3 Feyzabad, Badakshan Province (70°E–71°E, 36°40'N–37°20'N)

Feyzabad is located in the northern part of Afghanistan, and “the northern horns of the Hindu Kush Mountain System.” Traveling in this alpine ter-

rain is difficult, even by foot, where elevations range from 6560 to 11,480 ft (2000 to 3500 m). The high, narrow peaks in this region rise up to 14,760 ft (4500 m). Mountain passes are usually located in the river valleys. The soils in the river valleys are sandy soil with gravel. The region is considered high steppe with sparse ground cover and patches of poplar and willow trees in the river valleys. The climate is classified as dry continental and varies according to elevation from moderately warm in the valleys to very cold above 9840 ft (3000 m). Snow is common in the winter months at elevations greater than 9840 ft (3000 m) and could last 3 to 6 months. Snow cover can be up to 3 ft (1 m) in depth. Spring and fall can have unpredictable weather and precipitation in a form of either snow or rain is possible. Summer months are cool and snowfalls are likely in the mountains.

2.1.4 Farah Area, Farah Province (62°E–63°E, 32°N–32◦40'N)

Farah Province is located in the southwestern part of Afghanistan. Open, gently rolling and hilly plains are dissected by the Farah Rud River valley as well as numerous intermittent rivers and dry washers. Elevations range from 1970 to 3280 ft (600 to 1000 m). Soils in the area are coarse-grained, with abundant sand and gravel as well as cobbles. Higher elevations have sandy soil and rock outcrops. The water table is commonly encountered 30–70 ft (10-20 m) below the surface. The vegetation of the area is classified as desert and semi-desert. The climate is considered as subtropical to moderately continental. There are two distinct seasons: cold and warm. Cold season, from November to March, has a wide range of temperatures from 86°F (30°C) during the day to below 32°F (0°C) at night. Precipitation is most likely to come in the form of rain. Warm season is typically very hot and dry and high temperature can exceed 104°F (40°C).

2.1.5 Herat Area, Herat Province (62°E–63°E, 34°N–34°40'N)

Herat Province, located in the western part of Afghanistan, is mountainous with elevations that range from 4920 to 8860 ft (1500 to 2700 m). Mountainsides are mostly steep, rocky, and connected by gullies and river valleys. The valleys are flat to moderately steep and intersect with dry washes, deep ravines, and gullies. Soils contain coarser-grained cobbles, gravel, and sand in the mountains and abundant clay in the valleys. The vegetation of the area is semi-desert, with sparse plant cover of mainly low shrubs. The climate is considered dry continental. Winter is relatively mild, giving way to rainy and windy springtime weather. Summer can be

long with hot and dry, and fall is usually warm and dry. The area is seismically active.

2.1.6 Kandahar Area, Kandahar Province (65°E–66°E, 31°20'N–32°N)

Kandahar, in the southern part of Afghanistan where a high, gentle rolling plain has elevations that range from 2950 to 3280 ft (900 to 1000 m), lies south of the sandy desert region. The southern margin of Hazarajat upland is located in the northwest of Kandahar. In the northwest and northeast, the prevailing elevations are 4265–4920 ft (1300-1500 m), with narrow mountain peaks that are connected with various ravines. In the south, soils are sand and sandy gravel, while soils in the north are rubble with sand. The area is desert to semi-desert and vegetation is sparse ground cover and low shrubs. The climate is classified very dry and continental. There are two distinct seasons: cold and warm. The cold season is from November to March, with a wide range of temperature from a maximum of 86°F (30°C) during the day to below 32°F (0°C) at night. Precipitation is mostly in the form of rain. The warm season is typically very hot and dry with high temperature sometimes exceeding 104°F (40°C).

2.1.7 Gardez Area (69°E–70°E, 33°20'N–34°N)

The Gardez area is located in southeastern Afghanistan, and includes the provinces of Khost, Logar, and Paktiya. The terrain here has forested mountain, and is dissected by watercourses. The typical elevation of the mountains ranges between 6560–9840 ft (2000-3000 m). The mountainsides have 20 to 40° slope at the higher elevations and 5 to 15° slopes at the lower elevations. The valleys are dissected with deep and narrow rivers. Soils in the mountains are predominantly coarse-grained with cobbles, gravel, and sand. The soils in the valleys are sands and gravel. Deciduous trees are common at lower elevations and mixed forests (deciduous and coniferous) are common at higher elevations. Drought resistant grasses are common in the valley. The climate is continental and dry and varies depending on elevation. The climate is moderately warm in the valleys and cold at higher elevations. In the valleys, normal winter temperatures are 37–43°F (3-6°C) in the daytime and 23°F (-5°C) at nighttime; the temperature in the mountains ranges from 23 to 14°F (-5 to -10°C) in the daytime. Snow accumulation up to 3 ft (1 m) can be expected. Spring weather in the valley and mountains is humid, producing unstable weather. In the summer, it is typically hot in the valleys and precipitation is rare, with high

temperatures of 77–86°F (25-30°C). Frost begins in late October or early November in the valley.

The locations highlighted above only captured the four corners and the centers of Afghanistan and underline the diversity of the regions (see Fig. 1). This is one of the reasons why application of U.S. construction standards is difficult to achieve and enforce.

2.2 Social and Cultural environment

Afghanistan is a multi-tiered society. Ethnicity, tribalism, and regionalism create a social divide in Afghanistan (Emadi 2005). Dominant ethnic groups use their power to suppress the efforts of other ethnic and tribal groups by marginalizing their role in decision making processes and depriving them of opportunities. However, Afghans are typically strong, resourceful, and possess great reserves of energy and ingenuity. They observe many national holidays and religious festivals.

Afghan society had been fundamentally transformed during the continuous conflict of the last 30 years or so. In the chaos, hundreds of thousands of intellectuals, technocrats, and political moderates, including the Islamists, fled the country (Lyon 2009). Up to 90% of university teachers were part of the exodus and the school system was broken down and destroyed. The transformation affected both the economic and educational capacity. With a whole generation of children left without education, literacy rates are abysmal (Ewans 2002; Emadi 2005). Thus, Afghanistan has limited technical (engineering) capability because only a few engineers have graduated in the past 35 years.

Afghanistan has a tremendous problem with landmines (Ewans 2002). Thousands of minefields were planted in the country during the Soviet occupation and the subsequent civil war. While progress has been made in identifying and recording the landmines, many locations have not yet been identified. This is one of the serious safety issues.

The culture in Afghanistan plays a significant role in the success or lack of success during planning and construction of facilities and infrastructure. Afghans have remained “tribal,” meaning that citizens living in different provinces can have different cultures and even different languages. Entezar (2007) explained that the Afghans depend heavily on religion to cope with fear and uncertainty. Afghans are usually not risk-takers and compe-

tition is disliked. In addition, preparation and long-term planning is non-existent for Afghans.

There is no such thing as land title for land owners in Afghanistan. Land owners are influenced by rural politics through their economic positions and through their connections with local clerics (Emadi 2005). Land ownership in Afghanistan is complicated. Some lands have private ownership, which is typically shared with families and blood relatives. Other lands are government-owned and sold to private owners or awarded to retired military personnel for pensions. Some lands are common lands that are shared and controlled by families of tribal clans.

The continuance of the tribal nature of this country is largely the result of poor communications and poor transportation infrastructure. For construction, this means that Afghans in different provinces will have different skills and different expectations for structures.

Another major problem in Afghanistan is the rampant corruption (Lyon 2009) that has hampered the reconstruction and stabilization efforts in the country. Unintended consequences related to issuing project contracts have persisted for years. The Afghanistan President, Hamid Karzai, acknowledges this concern and suggests working together to agree on common norms, standards, rules, and a code of conduct to combat contracting corruption.

2.3 Design and Construction Standards

Centuries ago, Afghans' architectural influence was driven by immigrants and invaders (Emadi 2005). Some of these famous structures still stand today. The architecture in the northern region reflected the cultural influence of Central Asia. Ancient Persian influence can be recognized in the architecture around the Kabul area. Other areas, including Bamyan and part of Kabul, are influenced by ancient Gandhara. Architectural monuments from other traditions can be found elsewhere in the country, including Greek columns, shrines, and monasteries, as well as Persian minarets (religious building towers) and public gardens. Famous structures with Islamic influence can be also found in places such as ancient mosques, mausoleums, and arches. Some of these architectural styles date back 12 centuries. Building techniques were developed to adapt to the environment and climate, enabling Afghanistan's architecture to evolve.

There is a wide range of construction practices (e.g., building a dwelling) in Afghanistan because of the broad cultural diversity. Buildings, especially in rural areas, are typical constructed by their inhabitants and not by professional builders or specialists (Barfield 2010). Afghan construction methods are parochial and limited to various regions and villages. Common local materials are adopted and used in the construction. A variety of dwelling types exist in many parts of the country, including tents, huts, yurts, flat and curved roofs, stone and mud walls, single buildings and village complexes. Each building type is specialized to meet the need and range of geographical locations, climatic conditions, and distinct cultural traditions. The thick-walled mud houses that are common in Afghanistan withstand the high heat in the summer months and low temperatures in the winter season. Bricks are available in places and stone is a common building material in areas along rivers and mountain slopes. Stones and clay are used to build thick walls to insulate from low temperatures and extreme weather conditions in mountainous regions at higher altitudes. Cave-type dwellings are found in areas where sandstone is abundant. Wooden structures (i.e., post and beam) can be found in regions with available lumber. Thus, Afghans are accustomed to non-western facilities and solutions.

The application of U.S. construction standards is often challenging, especially in remote and isolated parts of Afghanistan. These areas have insufficient industrial capacity to sustain a construction operation at a large scale and with a high-schedule demand. Construction equipment is not yet modernized, and the logistics of bringing modern equipment to remote locations is difficult. Trade skills among the local population are rudimentary (Affleck and Freeman 2010).

There are highways connecting major populated places but most roads are undeveloped and limited to the populated areas and villages. In the 1960s, the United States helped build a highway connecting Kabul and Kandahar, Afghanistan's two largest cities. The highway, beginning at Kabul, passed through the country's core provinces and the ancient market city of Ghazni, descending through Qalat, and eventually reaching Kandahar (http://www.conservapedia.com/Afghanistan, October 2010). Some roads are paved, but most are gravel or unpaved (East View Cartographic, Inc. 2003). In remote areas, unimproved dirt country roads and trails are common. They run along the river valleys, and transport of goods and supplies is limited and difficult.

3 Approach

3.1 Data Collection

Existing lessons learned databases developed by the U.S. Army and USACE were found to contain stagnant and limited information concerning engineering and construction. Inquiries were then developed to examine the project execution perspective and topics that are absent in the existing lessons learned databases. The inquiries were gathered using both questionnaires and interviews. The questionnaire included questions of varying response types: multiple choice, yes or no answers, and open ended discussion (Appendix A). A Pashto translated version (Appendix A) of the questionnaire was used to gather input from Afghan engineers and outside contractors in-country; the inquiry was conducted, compiled, and translated by Ohio University (OU). OU works with faculty from several Afghan universities and has contacts with local engineers and contractors. The expectation was that local language and cultural connections held by OU faculty would not only make the Afghan surveys possible, but would generate clearer and more frank responses than any USG agency inquiry.

The questionnaire included the following sections: Contact Information, General Project Information, Planning and Site Assessment, Contracts, Design and Construction, Materials, Quality Control and Quality Assurance (QC/QA), Other Project Considerations, Education and Training, and Maintenance and Operations. In most cases, the questionnaire was sent out to the individual via e-mail. The recipient of the e-mail had a choice of several options for participation, including:

- Completing the questionnaire.
- Writing a response not using the questionnaire format.
- Obtaining an interview.

Also included in the introductory e-mail was a request for direct knowledge of relevant information that the person might want to share, based on personal experiences with projects and other input that the questionnaires left out or failed to consider.

The inquiry was sent to a variety of key personnel, including those deployed and redeployed by various agencies (USACE Engineer District, Afg-

hanistan–North and USACE Engineer District, Afghanistan–South, and other U.S. military engineers), U.S. and international contractors, Afghan engineers and contractors, and the Afghanistan Ministry of Public Works. The responses came from personnel with diverse backgrounds and responsibilities in engineering, construction, program management, contracting, and many other areas. Both the completed questionnaires and the written responses were returned directly. Those individuals involved in multiple projects were asked to complete the questionnaire twice: one response for a project that was considered a success and a second for a project that was difficult or not successful. However, all respondents gave a single input that offered and explained all of their first-hand experiences, good or bad, successful or unsuccessful, with both problems and solutions.

The interviews were conducted either via phone calls or face to face meetings in Afghanistan. Interview questions were based on general topics (i.e., materials, contracts, requirements, processes, etc.). Each person who was interviewed had the opportunity to review and add comments. Most of the responses were based on direct experience and knowledge, which depended on their background, project involvement, and responsibilities. In some cases, clarification was required and was completed via e-mail or phone call.

A separate questionnaire was developed to gather information and perspectives from the customers and end-users (Appendix A). Customer input was needed to capture the issues and challenges that they faced in developing requirements for building specific types of infrastructure. End-user input provided an additional, useful perspective to the final results for built facilities. Similarly, these inquiries were conducted via an introductory e-mail and responders selected their preference for an interview or written questionnaire.

Responses were compiled in a database using Microsoft Excel. Items and questions in the questionnaire are in the first column of the files, with subsequent columns used for input from various responders. Simple queries can be used for specific entries and issues. The names of the responders have been removed; however, information about their responsibilities is listed. The database will be published on SharePoint with limited access. Permission to access the database is available, upon request, to both USACE and non-USACE personnel.

3.2 Data Summary

The response rate was approximately 85%. There were 46 total responses (Table 1); 30 from questionnaires, 13 from interviews, and 3 from written replies that did not use the questionnaire format. Of the responses, 43 were directly related to project execution, management, oversight, design, engineering, and construction; 22 of the responses were project-specific, while 24 were general project summaries.

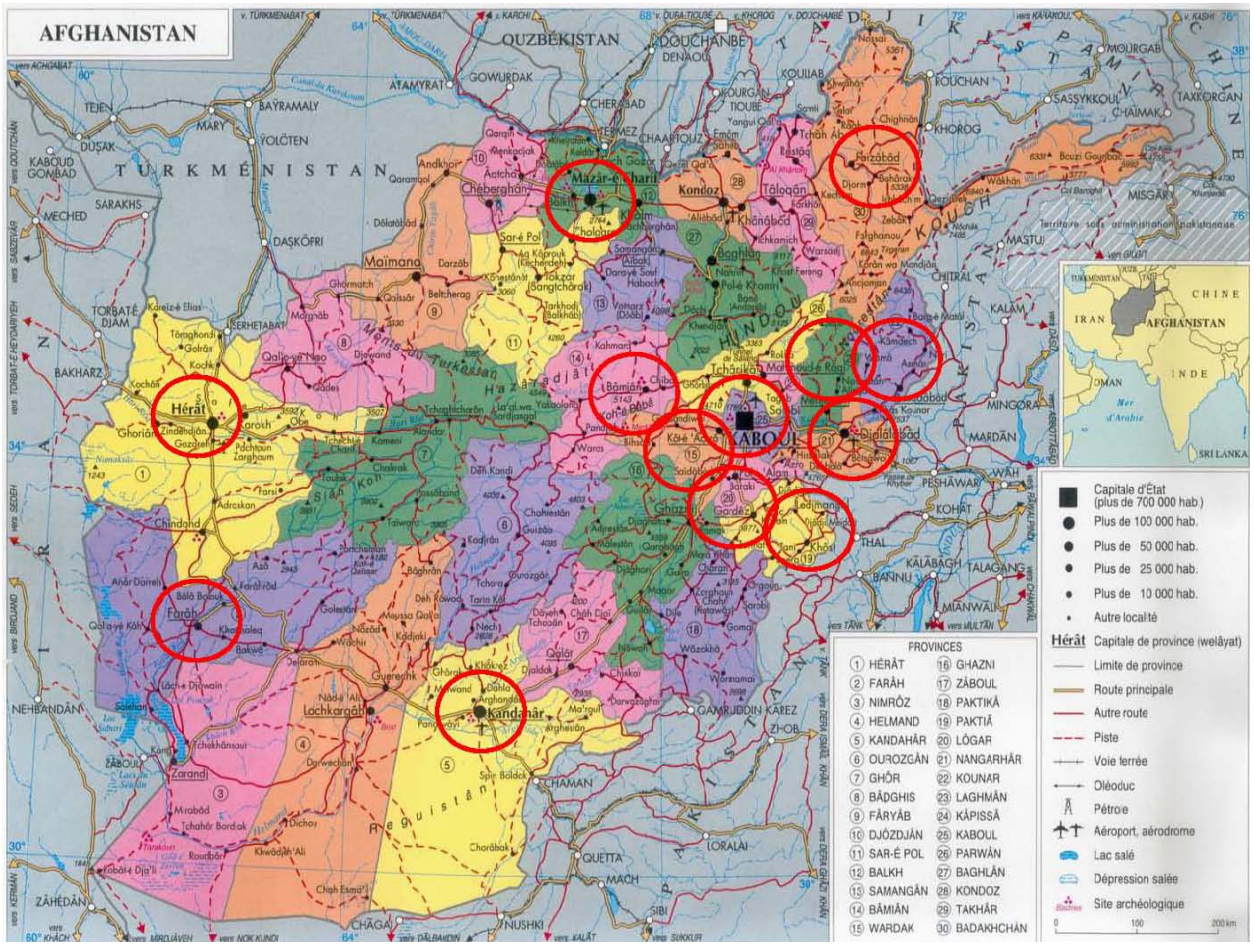

Figure 1. Lessons learned for projects executed in various provinces in Afghanistan, which are highlighted in red circle (from Division photographique [Direction des Archives] du Ministère des Affaires Etrangères, 2000).

The lessons learned responses concerned projects located in provinces across Afghanistan (Fig. 1), including Kabul, Nuristan, Wardak, Paktiya, Bamyan, Badakshan, Farah, Herat, Gardez, Mazar E. Sharif, Lagman, Nangarhar, Khost, Kandahar, and others. These data provided a snapshot of information for projects with starting dates from 2005 to June 2010. A variety of construction project types are represented, including several Afghan Police Stations, numerous Afghan National Army facilities and

garrisons, several road projects, airports, irrigation systems, dining facilities, clinics, and other general facilities. The project construction costs ranged from several hundred thousand dollars to hundreds of millions of dollars.

Table 1. Breakdown of responses by various agencies and responsibilities.

Agencies	Responsibilities	Number of responses
USACE	Project execution, management, design, engineering and construction oversight	16
U.S. Military		4
U.S. and international contractors		10
Afghan engineers and contractors, and Ministry of Public of Public Works		13
Customer (CSTC-A)	Project requirements and development	2
End-user (U.S. Military mentor)	User of facilities	1

4 Analysis

In order to allow a quantitative analysis of the input provided by the respondents, the questionnaires and interviews were evaluated with the following techniques.

4.1 Text Analysis and Frequency of Problems and Solutions

All of the responses were read and analyzed by a working group of two or three persons. The group went through each of the responses thoroughly and interpreted the answers and comments. To minimize biased opinions, the group debated and scrutinized each other's point of view in trying to determine the essence of each answer or comment. Each response was captured using short phrases that essentially restating the respondents' input. Each of these summarized items was assigned to one of the following themes:

a) Contracts—concerning the processes before and after contracts are emplaced. This also includes: documentation containing the agreement and adhering to the contract, payment, contractor performance and tracking progress, and spelling-out design requirements.
b) Site Assessment and Planning—evaluating and considering the environmental, geotechnical and climatic conditions of location for design and construction, including the planning and logistical process
c) Design and Construction—meeting the specification and requirements; following the design and execution
d) Materials—using the required materials based on the design requirements
e) Quality Control and Quality Assurance—pertaining to workmanship: meeting standards, following the test methods, and the quality of construction
f) Cultural Issues—relating to local beliefs, practices, norms, philosophy, views, and outlook
g) Education— providing and promoting education reflected in various avenues: teaching, training, and mentoring in order to grow local construction and technical knowledge.
h) Resources—concerning with exchange of feedback within organization, and communication and exchange of information between inter-agencies.

The working group also interpreted whether each answer or comment was expressed as a problem (an issue) or a solution when generating the summary phrases. If an answer or comment given by the current respondent touched on the same problem or solution mentioned by a previous one, the existing summary phrase was counted again. Noting the number of times a similar response was provided gave an indication of the frequency of certain problems and solutions and resulted in total tally for each. A separate tally was also kept for problems and solutions that were noted by the Afghan (i.e., local nationals or LN) input. This allowed the opinions of the international community to be differentiated from the local feedback and analyzed separately. The numbers for total tally in the database for each phrase includes the LN input (total is the sum of international and LN responses).

The working group generated a total of 245 phrases capturing both problems and solutions from the responses. The summarized phrases encompassed the experiences and lessons learned from construction projects throughout Afghanistan. Some of the phrases are very specific; for many of these cases the comment occurred in only a few of the responses. Appendix B lists all 245 summary phrases.

4.2 Categorization

Because of the long list of summarized phrases, the working group clustered the phrases further by grouping them under common "words" or terms based on an interpretation of each item. The process involved examining the entire list of phrases, then looking for common threads among the items that reflected a recurring concept. The categories are independent of each other and not mutually exclusive; thus, a single item that reflected several concepts could be assigned to more than one category. The following categories were developed by the working group:

- Availability of Materials—issues affecting the availability of construction materials.
- Appropriate Materials per Region—categories reflected designing infrastructure using appropriate materials for the region.
- Rule of Law— enforcement of criminal and civil law affecting corruption, theft, and other non-violent offenses.
- Schedule—timely execution of tasks.

- Quality Material—quality and variability, availability, and types of materials used.
- Specification—standards and criteria to follow for physical properties of materials used or proposed. Specification partly governs the quality or performance of the completed work.
- Process—management, rules or procedures, mechanisms and tools for tracking progress, resources, government staff (i.e., Afghan government) and outside contractors' controls. Processes are broken down as follows:
    - Process staff and resources—resources and staff in the contracting and project execution processes.
    - Process procedures—rules and procedures governing the contracting and project execution processes.
- Real Estate—consideration of the physical location acquisition and site access.
- Knowledge and Data—the availability, collection, management, record keeping, communication, and transfer of pertinent information.
- Security and Safety—force protection and work site safety.
- Environmental Conditions—climate, weather, geological and hydrological conditions, and geotechnical information.
- Local Expertise—the technical capacity of local people, and indigenous knowledge and insight.
- Coordination—working together within government agencies; communication and relationships among government, locals, contractors, and other parties
- Sustainability—capacity development, infrastructure that the local government can maintain and operate, standards that are practical for the end-users, and local economics affecting current and future infrastructure development.
- Expectation—understanding the expectations of various parties; agreement on the scope of work and strengthening the relationship among parties or organization involved.

5 Results

Based on the analyses, a summary list of common problems affecting various aspects and stages of the construction projects was completed (Appendix B). Some of the problems began during the planning and contracting phases and escalated as the project progressed. A problem has relational links to one or more issues, and could trigger another. Similarly, a solution can address one or more related problems. The solutions were identified by the responders and the lists do not entirely address all of the problems. In addition, a solution may not have a one-to-one relational link to the problem.

5.1 Categories

Table 2 shows the list of phrases summarizing problems with counts greater than 3. Each problem represented the direct (denoted by letter d) and indirect (denoted by letter i) impact for various aspects of a construction project. A summarized phrase is likely to have categories with direct and indirect impact as a consequence for that particular problem or as the result of a solution. The major issues highlighted by higher problem counts corresponded to design and construction challenges. These challenges were followed by contracts, cultural, materials, education and site assessment and planning.

The first one with the highest count was a problem: *Security problems during construction (e.g., stealing materials), delays due to security and attacks*; it was mentioned in the responses under design and construction phase theme by 14 responders. In addition, this problem was directly (d) impacting materials being used during construction and was indirectly (i) impacted by the cultural environment. Another major problem, with a total count of 12, was *Issues with not accounting for climatic (weather) conditions*, which was primarily affecting design and construction. These weather effects included rain, frost, or freezing temperatures, and extreme heat and flood. These conditions are a function of terrain, climate, and hydrology where the projects were located. This could be in mountainous areas, with drainage problems and an erosion prone environment, and where snow and ice conditions are likely. These issues should have been addressed during the planning process.

Table 2. Summary of problems with counts 4 and higher.

Summarized Phrase	Theme	Count	Availability-Materials	Appropriate-Materials-Region	Rule-of-Law	Schedule	Quality- Material	Specification	Process	Process-staff-resources	Process-procedures	Real-estate	Knowledge-data	Security and Safety	Environmental conditions	Local-Expertise	Coordination	Sustainability	Expectation
Security problems during construction (e.g., stealing materials), delays due to security and attacks	Design and Construction	14	d		d	d								d					
Issues with not accounting for climatic (weather) conditions	Design and Construction	12				i			i						d				
Westernized requirements not applicable in some cases	Design and Construction	10		d														d	
USACE short deployment in personnel & inappropriate background	Contracts	9				i			d	d							i		
Job site safety	Cultural	9												d			i		
Quality varies dramatically	Materials	7					d												
Accustomed non-western facilities and solutions	Cultural	7		d											d			d	
How are the local nationals going to maintain and do repair to the infrastructure with limited/local capability and resources? (Facilities are beyond the ability for end users to maintain-not prepared).	Education	7							i		i					d		i	
Drainage & Erosion—water ponding	Design and Construction	6													d				

Summarized Phrase	Theme	Count	Availability-Materials	Appropriate-Materials-Region	Rule-of-Law	Schedule	Quality- Material	Specification	Process	Process-staff-resources	Process-procedures	Real-estate	Knowledge-data	Security and Safety	Environmental conditions	Local-Expertise	Coordination	Sustainability	Expectation
Corruption and bribery	Cultural	6		i	d	i	d												
Unfamiliarity of construction design and construction techniques (Afghanistan)	Design and Construction	5														d			
Poor quality materials	Design and Construction	5					d												
Problems finding materials and lead time to plan in advance in procuring materials.	Design and Construction	5	d			d													
PM decisions are made without in-country or boots-on-the-ground engineering feedback	Contracts	4							d	d							d		
Poor data management leads to loss of critical info and continuity:	Site Assessment and Planning	4							i				d					i	
Security hinders access	Site Assessment and Planning	4				i			i				i	d					
Demining Issue (i.e., UXO removal)	Site Assessment and Planning	4				d			i					d					
Local territorial labor issues (one is not welcome to work in another village)	Design and Construction	4												d					

Summarized Phrase	Theme	Count	Availability-Materials	Appropriate-Materials-Region	Rule-of-Law	Schedule	Quality- Material	Specification	Process	Process-staff-resources	Process-procedures	Real-estate	Knowledge-data	Security and Safety	Environmental conditions	Local-Expertise	Coordination	Sustainability	Expectation
Sourcing material can take a long time (6 months or more)	Materials	4	d			i													
No standards and criteria for imported materials	Materials	4		d			d	d											
Higher quality materials need to be imported	Materials	4	d		i	i	d										i		

Problems finding materials and *Lead time to plan in advance in procuring materials* were issues that impacted design and construction, as well as materials. This had an effect on both the availability of the materials used and the construction schedule. One of the common culturally related issues was that while the Afghans were (and are) *Accustomed to non-western facilities and solutions*, westernized design and construction methods were and are still being used for the facilities being built.

Initially, design-build was implemented on projects in Afghanistan. Design-build is a construction project delivery system where the design and construction aspects are performed under one single contract. This did not work well because design-build projects were awarded to unqualified companies. Local nationals could not handle the design and USACE did not have sufficient manpower to review a different design every time. Eventually, site-adapt was implemented on most construction projects. Site-adapt means the government agency provides the design, plans, and specification for the structure and conducts Request For Proposal (RFP). RFP is a solicitation and bidding process to invite qualified contractors to submit a bid for a specific project. The bidders or contractors will provide 65% of site design, including earthwork analysis and geotechnical investigation. The "adapt" means that the contractor can be changed and modifications can be made to the exterior utilities to adjust for site conditions. The implementation of site-adapt as a delivery mechanism has improved construction process and the execution of projects and is much easier in the review process. However, issues have been raised regarding implementation. Some facility designs are not regionally appropriate and there is little flexibility for modification.

The summary of solutions with counts greater than 3 is specified as one of the top-ten mentioned outcomes by responders in summarized phrases (Table 3). Similar to the list of summarized problems, the solutions represented the direct (denoted by letter d) and indirect (denoted by letter i) impact for various construction project aspect. The major highlighted solution counts addressed design and construction challenges. Other highlighted effective solutions addressed issues for education, cultural, site assessment and planning, contracts, and quality assurance and quality control during construction.

The highest count was a solution, indicating *Mentor contractors, designers and local workers in design and construction*, which meant that education

was a critical component for project progress. This solution was mentioned by 13 responders. Design and construction aspects seemed to have *Anticipate the climatic and weather effects in design & construction* as a very specific solution that emphasized addressing the issues of not accounting climatic and weather conditions.

Build simpler and appropriate facilities was one of the solutions that addresses the impact of cultural sensitivity. This solution indirectly affected the site assessment and planning in determining the appropriate materials to use in design and construction.

Several solutions were introduced to address quality assurance and quality control. These included the following: Afghans' test facilities and testing capacities have improved—USACE has inspected and approved Afghan laboratories and test equipment with great success and laboratory facilities are becoming reliable in some locations. USACE employees have trained Afghans well, and have a program for hiring LNs for QA/QC. All of these were successful efforts because time and resources were invested in mentoring and training the Afghan construction staff and practitioners.

5.2 Local National (LN) versus U.S. Engineers and International Construction Staff

Of particular interest is that U.S. engineers and construction staff as well as international contractors have acknowledged most of the problems emphasized by the Afghan engineers and practitioners. Table 4 highlights the summarized problems specified by the Afghan engineers, contractors, and construction practitioners. The total count was 12 for the entire data set: 9 LNs stated that Issues with not accounting for climatic (weather) conditions in the design and construction was important; interestingly this issue can be addressed by the anticipation of environmental conditions and weather effects. An issue was linked to lack of coordination by the project managers (*PMs) whose decisions are made without in-country or boots-on-the-ground engineering feedback* listed in Table 2 and *Not listening to local suggestions and insights about conditions*, as stated by the LN.

The challenges of *Security problems during construction and delay due to security and attacks* were of concern not just for the international staff but also for the Afghans. Afghanistan has no enforcement of physical and health protection in construction, so *Job site safety* was one of the cultural dilemmas that must become a part of education. The LNs have raised the

issue that there are *No standards and criteria for imported materials*, which directly impacts the quality of materials being used and the construction outcome. Along with that, material *Quality varies dramatically* in projects. For information critical to site assessment and planning phases, the LNs have raised several issues related to proposed construction sites such as the need to *Acquire real estate and right of way* and *Limited site assessment for the exact location*, and *Lack of hydrological data*.

Table 3. Summary of solutions with counts 4 and higher

Summarized Phrase	Theme	Count	Availability-Materials	Appropriate-Materials-Region	Rule-of-Law	Schedule	Quality- Material	Specification	Process	Process-staff-resources	Process-procedures	Real-estate	Knowledge-data	Security and Safety	Environmental conditions	Local-Expertise	Coordination	Sustainability	Expectation
Mentor contractors, designers and local workers	Design and Construction	13														d	d	i	
Anticipate the climatic and weather effects in design & construction		8				i									d				
Adjust the site-adapt design regionally, modify codes for contingency operations and austere environment		8		d				d	d		d				i			d	
Require on-the-job training	Education	7							i		i							d	
Greater focus on mentoring and training to develop self-sufficiency	Education	7																d	
Tough, simple, geographically replaceable mechanisms and hardware	Design and Construction	6		d														d	
Build simpler and appropriate facilities (austere)	Cultural	6													d			d	
Maintain support and coordination with landowners/local proponents buy-in.	Site Assessment and Planning	5							i	i							d	i	
Site-adapt / Austere design works well	Design and Construction	5		d					i									i	
Buy local material and use local businesses to develop local economy	Cultural	4							i		i							d	

Table 4. Summary of problems mentioned by the Afghans.

Summarized Phrase	Theme	LN Count	Count	Availability-Materials	Appropriate-Materials-Region	Rule-of-Law	Schedule	Quality- Material	Specification	Process	Process-staff-resources	Process-procedures	Real-estate	Knowledge-data	Security and Safety	Environmental conditions	Local-Expertise	Coordination	Sustainability	Expectation
Issues with not accounting climatic (weather) conditions:	Design and Construction	9	12				i			i						d				
Security problems during construction (i.e. stealing materials), delays due to security and attacks	Design and Construction	4	14	d		d	d								d					
Job site safety	Cultural	4	9												d			i		
No standards and criteria for imported materials	Materials	4	4		d			d	d											
Quality varies dramatically	Materials	2	7					d												
Better way of analyzing reasonable performance periods to get duration into contracts	Contracts	2	3				d			i										i
Access to work sites for QC/QA: security & logistics	QC and QA	2	3												d					
Acquire Real Estate and right of way	Site Assessment and Planning	2	3							i			d							
Limited site assessment for the exact location		2	2							i			d	d				d		
No hydrology data		2	2											d		d				

Summarized Phrase	Theme	LN Count	Count	Availability-Materials	Appropriate-Materials-Region	Rule-of-Law	Schedule	Quality- Material	Specification	Process	Process-staff-resources	Process-procedures	Real-estate	Knowledge-data	Security and Safety	Environmental conditions	Local-Expertise	Coordination	Sustainability	Expectation
Big projects are difficult for small company	Contracts	2	2														d			
Different regulations or rules to award contracts from donor to donor leads to low quality, high cost projects	Contracts	2	2							d		d						d		
Small LN contractors lack resources and relationship to compete against large companies with more resources to win contract	Contracts	2	2														d	d		
Contractor Quality and Management (CQM) paperwork is difficult to follow which impacts material selection and design	QC and QA	2	2					d		d		d								

Local Nationals brought up contracting issues, including the need to find a *Better way of analyzing reasonable performance periods to get appropriate durations into contracts*. This issue was related to "process" and expectations were either not communicated or the statement of work was not followed. LNs were struggling as *Small contractors lack resources and relationship to compete against large companies with more resources to win contract* and having *Different regulations and rules from donor to donor for awarding contracts*. In summary, the LN contractors are challenged and overwhelmed with competition as well as regulations and rules.

5.3 Capturing solutions specified by the LNs

The LNs have also highlighted solutions to address some of the challenges (Table 5). To address site assessment and planning issues, the LNs emphasized solutions such as: *Maintain support and coordination with landowners/local proponent buy-in*; and *Good management, planning and creating a strong team and assigned roles and responsibilities*, which would require cooperation between government and locals as well as improved communication. Interestingly, solutions related to cultural aspects were also mentioned by the LNs; these included: suggestions to *Buy local materials and use local businesses to develop local economy*; and *Direct beneficiaries of employment during construction or job creation for local people*. These suggestions would create sustainability for capacity development and infrastructure that the local government can maintain and operate.

The LNs have reiterated the importance of education that encompasses effectiveness in various challenges of the project phase. Important educational needs highlighted were: *Training and educating of community to help with security*; *Train Afghan companies how to make and implement quality control plans and specifications*; *Train the local labor and masons for different activities; Requirement on-the-job training; Hiring and training locals for QA and other engineering related tasks*.

Table 5. Summary of solutions highlighted by the Afghans.

Summarized Phrase	Theme	LN Count	Count	Availability-Materials	Appropriate-Materials-Region	Rule-of-Law	Schedule	Quality- Material	Specification	Process	Process-staff-resources	Process-procedures	Real-estate	Knowledge-data	Security and Safety	Environmental conditions	Local-Expertise	Coordination	Sustainability	Expectation
Maintain support and coordination with landowners/local proponents buy-in.	Site Assessment and Planning	2	5							i	i							d	i	
Buy local material and use local businesses to develop local economy	Cultural	2	4							i		i							d	
Give local contractors projects they can handle as much as possible to promote	Contracts	2	3							d		d					d		i	i
Arrangement for more involvement of government ministries, such as MoPW, in overseeing the bidding process and construction work	Contracts	2	2							d		d					i	d		
Selecting contractor with good financial buffer or has funding capacity	Contracts	2	2							d		d					i			
Select contractor with qualified staff and past experience	Contracts	2	2							d		d					i			
There should be tier level of contract system	Contracts	2	2							d		d					d		i	i
Good management and planning, having a strong team and assigned roles and responsibilities	Site Assessment and Planning	2	2							d	d							d		

Summarized Phrase	Theme	LN Count	Count	Availability-Materials	Appropriate-Materials-Region	Rule-of-Law	Schedule	Quality- Material	Specification	Process	Process-staff-resources	Process-procedures	Real-estate	Knowledge-data	Security and Safety	Environmental conditions	Local-Expertise	Coordination	Sustainability	Expectation
Submittal process for review for list of material should be shorten	Materials	2	2				i			d										
Direct beneficiaries of employment during construction or job creation for local people (local involvement)	Cultural	2	2																d	
Training and educating of community to help with security	Education	2	2							i		i			d					
Train the local labor and masons for different activities	Education	2	2							i									d	
Train Afghan companies how to make and implement of quality control plans and specifications	Education	2	2						d	i		i							i	

6 Sector Analysis

6.1 Direct and Indirect Relationships of Problem and Solutions

The summarized phrases of problems within various themes (or aspects of the projects) are inter-linked. Similarly, the summarized phrases may address one or two problems in various themes. The selected problems from the summarized phrases are used for the sector analysis to illustrate the *direct* and *indirect* relationships during various aspects (themes/aspects) of the construction project. Figure 2 shows the *direct* (solid lines) and *indirect* (dashed lines) impact of a specific problem in relation to associated phases (themes) of the project. The *direct* impact means the problem can produce significant consequences or results affecting other aspect/themes. The *indirect* impact suggests the effect of the problem produces some consequences to other aspect/themes.

As an example, a problem related to contracting was that there were no or very minimal input from staff with in-country insights (or indigenous knowledge) as contracts were being defined and developed—*PM decisions are made without in-country or boots-on-the-ground engineering feedback*. This had a *direct* impact on site assessment and planning, design, and construction and resources. In addition, the same problem had an indirect impact and produced some consequences to materials and QA/QC.

A problem expressed in the site assessment and planning theme was that security hinders access. This particular problem had a *direct* impact, resulting in significant consequences to design and construction, and had an *indirect* impact to contracts, materials, and quality assurance and quality control.

Challenges in *Acquiring real estate and right of way* for construction projects were highlighted in the site assessment and planning theme. This should have been defined before a contract was released and, therefore, produced some consequences that affected the materials and design and construction.

A major cultural issue faced in projects was (and still is) corruption and bribery. This problem affects materials used and the outcome of design and construction of the project. Additionally, it has an *indirect* effect causing some consequences for site assessment and planning, quality assurance and quality control.

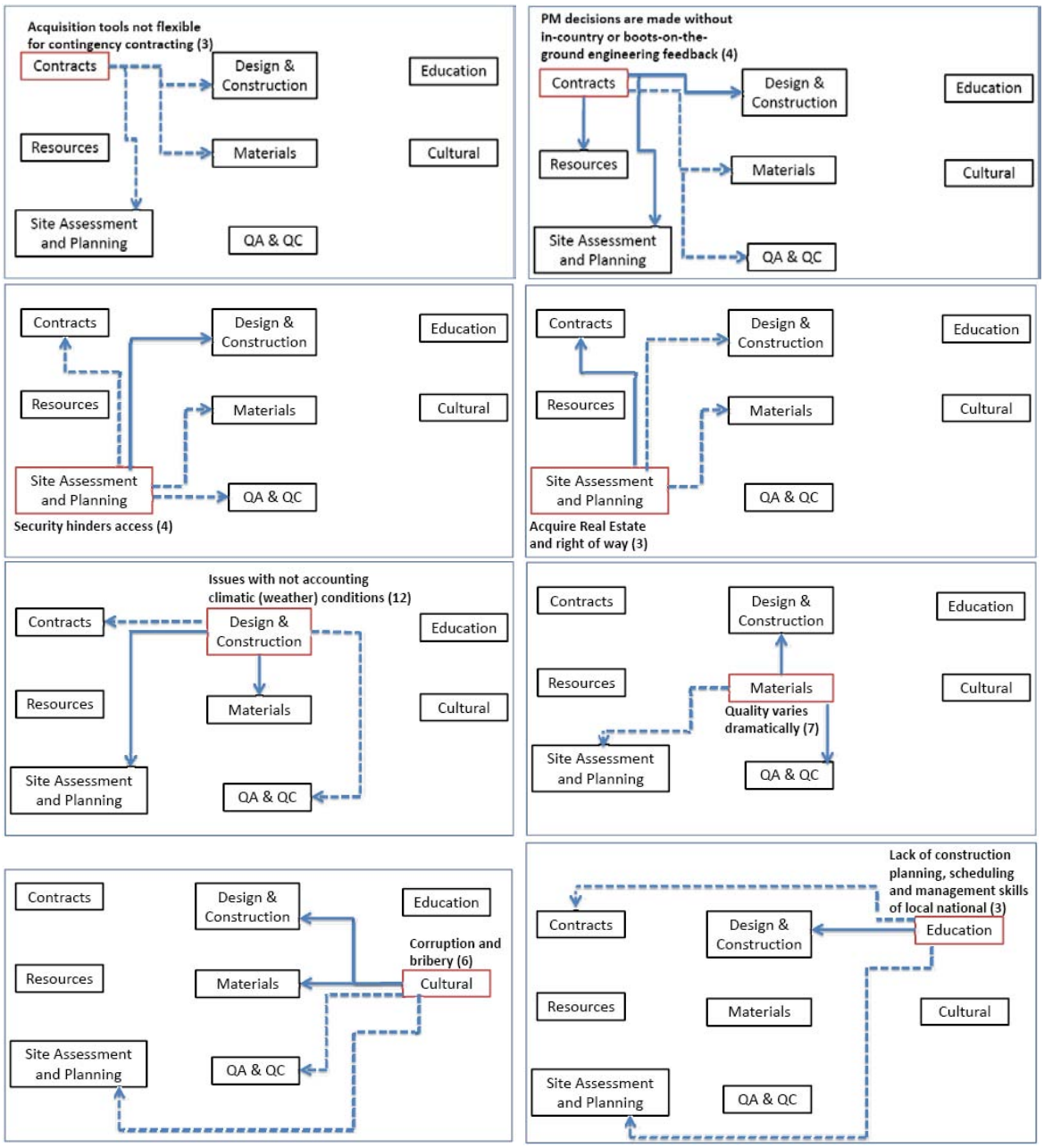

Figure 2. Direct and indirect relationships of a problem for each aspect. The solid lines denote direct impact and dashed lines denote indirect impact on a problem.

6.2 Frequency

The summarized phrases are binned further by clustering them using a common "word" or "category" based on the interpretation from the summary lists. These categories, defined in Section 4.2, are independent of each other and not mutually exclusive. The counts (frequency) are then populated for direct and indirect impacts. Figure 3 shows the list of categories on the *x*-axis that have direct impact on the corresponding aspect/theme (i.e., contracts, resources, site assessment

and planning, design and construction, materials, quality assurance and quality control, cultural and education). The processes include management, rules or procedures, mechanisms and tools for tracking progress, resources, staff within government and outside (e.g., Afghan government), and contractors' controls. In addition, the process is separated depending on whether it is related to staff (i.e., process–staff– resources) or whether it is related to procedures (i.e., process–procedures).

The categories are shown from the highest frequency to the lowest count (e.g., from left to right) with an exception of two: processes and materials (Fig. 3). Overall, the major issues started with the process, followed by schedule, security and safety, materials, coordination, local-expertise, environmental conditions, rule-of-law, specification and knowledge–data.

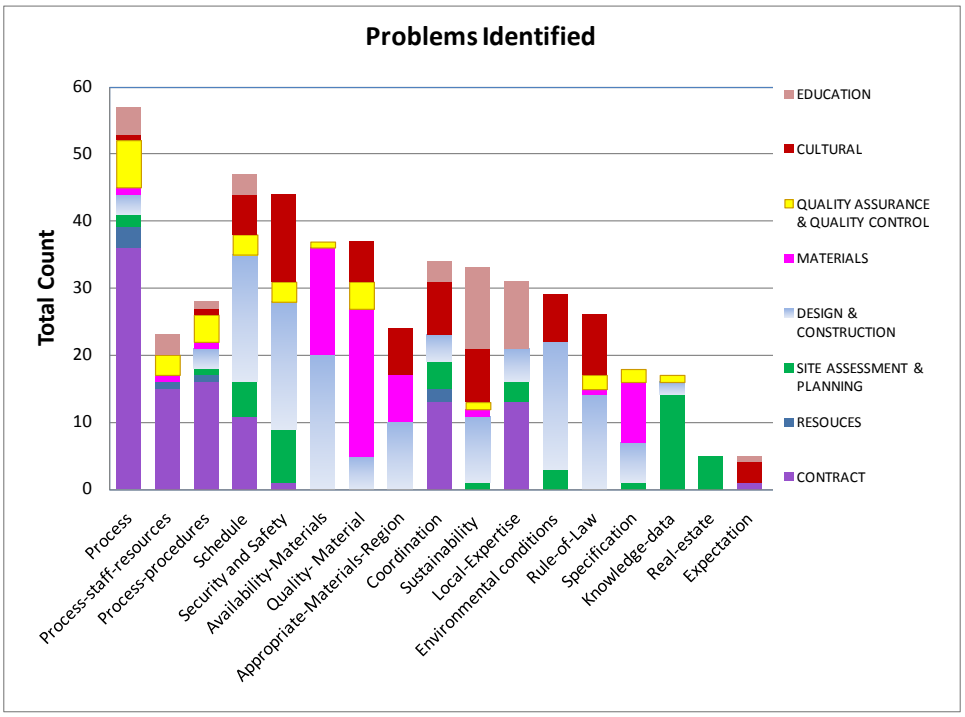

Figure 3. Direct impact frequency of summarized problems based on categories.

Process (includes process–staff–resources and process–procedures) had the highest direct impact on contracts. The direct impact was lack of coordination, which meant lack of communication and less cooperation between the government and locals. In addition, contracting challenges were depicted as being caused by the lack of local expertise (relating to the technical capacity of local people and not using the indigenous knowledge), and they affected scheduling in construction projects. Problems that related to site assessment and planning

were primarily attributable to knowledge–data, security and safety, schedule, real-estate, coordination, environmental conditions, and local expertise. For design and construction, major problems were availability of materials, schedule, security and safety, environmental conditions, and rule-of law. These were followed by appropriate materials in the region and quality of materials, sustainability, specification, local expertise, and coordination. Primary issues with material challenges included quality of materials, availability of materials, appropriate materials in the region, specifications matching actual materials used, sustainability of standards practical to the end-users, and lack of rule-of-law, causing material theft. Quality assurance and quality control (QA/QC) efforts were challenging problems in process, the quality of materials, schedule, security and safety, rule-of-law, and specification.

Figure 4 shows summarized solutions based on categories. Process had the highest frequency of solutions. Some of the example solutions identified for contracts included: give local contractors projects that they can handle as much as possible to promote contractors with local village connections to reduce security issues and have local buy-in; simplify the contract acquisition process; select a contractor with a qualified staff and past experience; coalition (military) needs to contribute to security and many others. Other major contributing solutions mentioned as part of the processes that affect the design and construction were to: adjust the site-adapt design regionally; to modify codes for contingency operations and an austere environment; and get feedback from the mentors who interact with the end users (Afghans) for input from the users.

Solutions for sustainability were addressed through education, cultural considerations, QA/QC, and design and construction. Solutions for education covered: *Greater focus on mentoring and training to develop self-sufficiency*; *Require on-the-job training;* develop trade school and specialized training (geotech, surveying, etc.); hiring through the use of specific taskers for mentoring and training; developing classroom materials and many other training and mentoring solutions. In terms of cultural sustainability, major topics for solutions included: *Build simpler and appropriate facilities (austere)*; *Provide projects that engage cultural architecture; Buy local materials and use local businesses to develop local economy*. Development of more practical standards; the use of tough, simple, geographically replaceable mechanisms and hardware; adjustment of site-adapt design to each regional condition, modification of codes for contingency operations and austere environmental conditions, were among the solutions suggested for design and construction to produce sustainability of infrastructure.

Suggestions for improvements with coordination focused on landowner support were emphasized. In addition to working with local landowners, other suggestions included: developing a list of local capabilities and constraints (can/cannot do), and arranging for more involvement of government ministries (e.g., Ministry of Public Works) in overseeing the bidding process and construction work. Working closely with local design and contractors, mentoring contractors and local workers, and getting feedback from the mentors who interact with the end users (Afghans) for input from the users were recommended. Better contact and communication with the local population will help solve security issues early in the project, achieving positive impacts for site assessment and planning processes. Other suggestions were: good management and planning; having a strong team with assigned roles and responsibilities; and maintaining support; and coordination with landowners'/local proponents' buy-in.

Building local expertise was addressed through training, mentoring, and the development of test facilities. Adjusting requirements for materials, to include concrete, brick masonry, and concrete masonry units (CMUs), was a good option for austere construction of buildings. These were solutions for adapting to appropriate materials of the region for design and construction solutions.

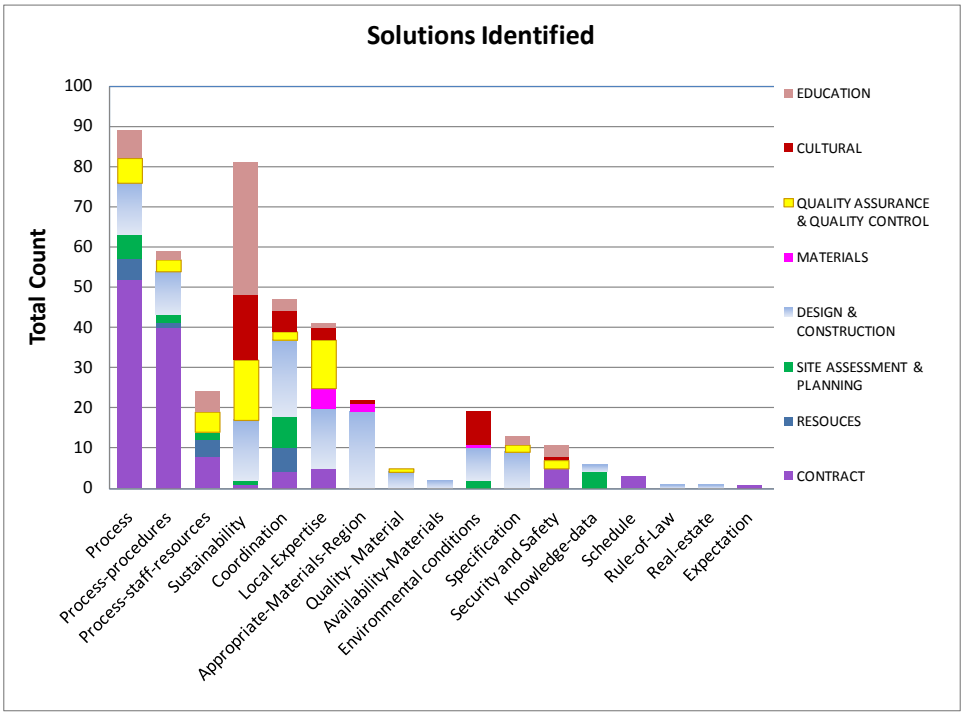

Figure 4. Direct impact frequency of summarized solutions based on categories.

7 Causal Mapping

The responses conveyed stories that told how issues and solutions were connected. Causal maps are visual representations of causal relationships among issues and solutions, as identified in the interview data. The purpose of representing data in this fashion is twofold: 1) to illustrate the interconnectedness among issues and potential solutions; and 2) to demonstrate complexity in a form not often seen in other analytic approaches.

The causal analysis for design and construction, and cultural issues is discussed below. These themes were selected because their story lines represent recurring causal arguments made throughout the responses. Each theme contains at least two important story lines. The complete causal map analysis of the interview data includes the following themes: design and construction, cultural, materials, site assessment, contracts, QA/QC and education, which can be found in Appendix C.

7.1 Design and Construction

7.1.1 Delays and Security Problems

7.1.1.1 Construction Delays

There are several factors that create construction delays with projects in Afghanistan (Fig. 5). First, the inability or unwillingness to account for climate and weather changes during the planning phase can cause delays during construction and work needs to be postponed, due to weather conditions. Second, conflicting standards for design and construction require additional effort and personnel to sort out and determine whether standards are not substantially different. Next, when national expectations are different from local expectations, often exceeding the local perspective, delays are imminent. In addition, westernized requirements that are not applicable in the local area take time to resolve during construction. Finally, materials that are stolen during collection or construction make for additional construction delays. The addition of security personnel and time required to correct and prevent theft creates additional costs.

7.1.1.2 Security Problems

General safety issues caused by natural or human elements can cause time delays and require additional expenses. An example of natural safety threat would be the presence of drainage canals in compounds. Several interview informants have

given examples of threats due to human elements, such as the potential for attacks during construction, especially on roadway projects. Delays and extra expense due to these security issues, can impact the feasibility of a construction project.

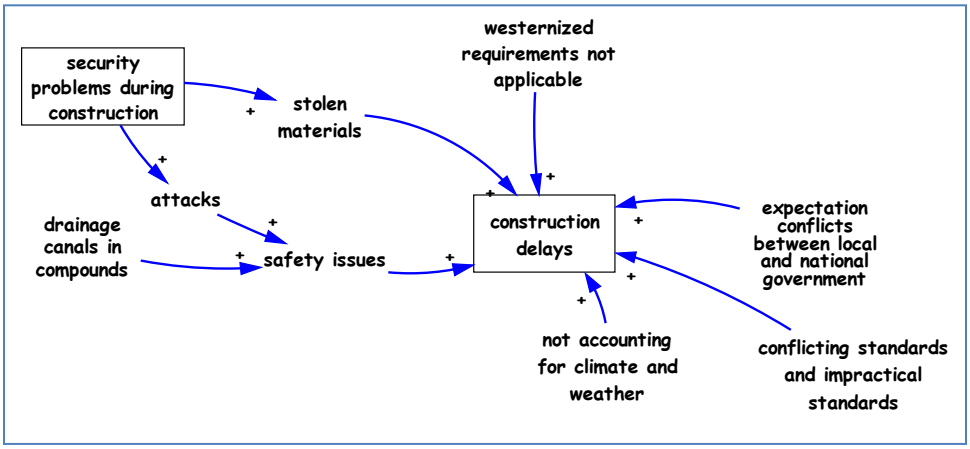

Figure 5. The issues: construction delays and security problems during construction.[1]

7.1.1.3 Solutions for Construction Delays and Security Problems

Suggestions of ways to alleviate the construction delays and security problems were discussed by the responders (Fig. 6). For example, the use of tough, simple, and geographically replaceable mechanisms and hardware would lessen the impact of westernized requirements that are not applicable to the region. The responders suggested that effort should be made to anticipate the climate, and weather effects should be a part of the planning process for estimating project duration. This effort would reduce construction delays caused by the elements. Security problems during construction could be lessened if support was sought from landowners in advance. With increased security effectiveness, there would be fewer attacks and fewer stolen materials. These relationships could ultimately reduce construction delays.

[1] Note to readers: Diagrams in this section are composed of phrases that capture causal relationships identified in the responses. The relationships include problems, issues and solutions, as discussed by the informants. The reader should keep the following notes in mind as they read the diagram: phrases are issues; arrow indicates directions of influence; "+" arrows suggest the influence of the first variable on the second variable is in the same direction; "–" arrows suggest that the influence of the first variable on the second variable is in the opposite direction; colored arrows identify new issues or solutions in the story line; gray arrows are topics that have been presented in a previous storyline; phrases in boxes are issues that have been identified as focal points of the storyline; circled phrases are solutions provided by respondents. Each theme contains two or more major story lines and each color represent a different story line.

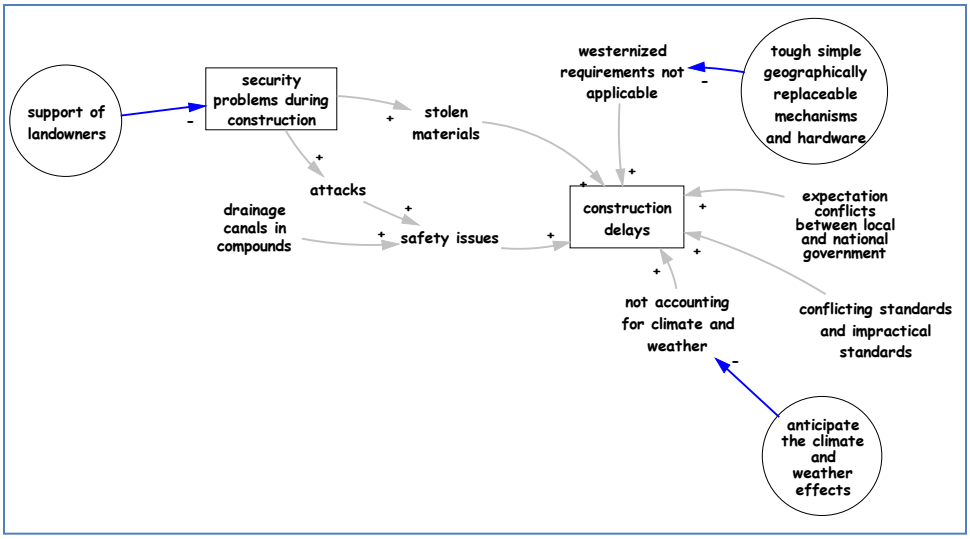

Figure 6. Solutions for construction delays and security problems. (Gray arrows represent the previous story.)

7.1.2 Labor and Land Suitability

7.1.2.1 Acceptable Skilled Labor

Concerns with limited skilled labor were revealed in the responses, which impacted design and construction and negatively affected the quality of projects in Afghanistan (Fig. 7). It was suggested there is a lack of awareness of the local labor capacities. Poor workmanship by local labor ultimately reduces the capacity for operations and maintenance on these projects. Complicating matters further, Afghanistan locals are not familiar with U.S. construction and design techniques. In addition, local labor is not transportable across the country, as territorial disputes make it difficult for people to work in villages where they are not welcome. These factors combined undermine reconstruction efforts in Afghanistan.

7.1.2.2 Unsuitable Land

The physical terrain of Afghanistan presents certain challenges to the design and construction of some projects (Fig. 7). Land that could be optimal from a security perspective may be unsuitable in terms of its physical terrain. For example, mountains in locations where Corps projects are intended may be difficult to clear, especially when blasting materials are difficult to procure.

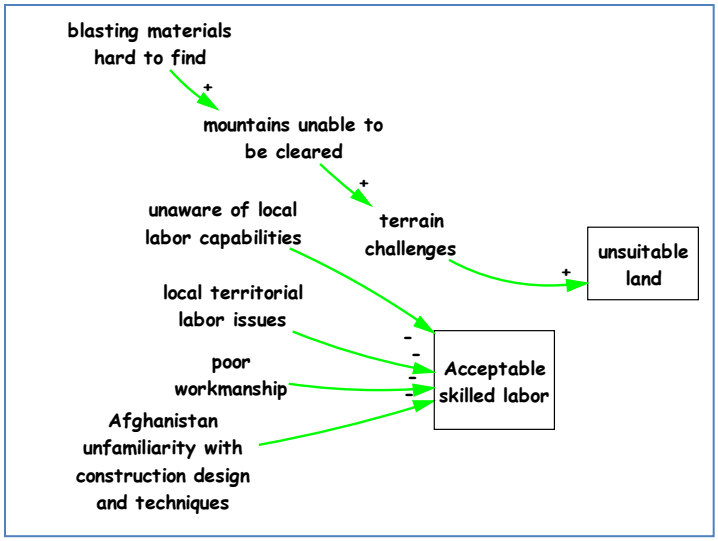

Figure 7. Issues related to labor and unsuitable land.

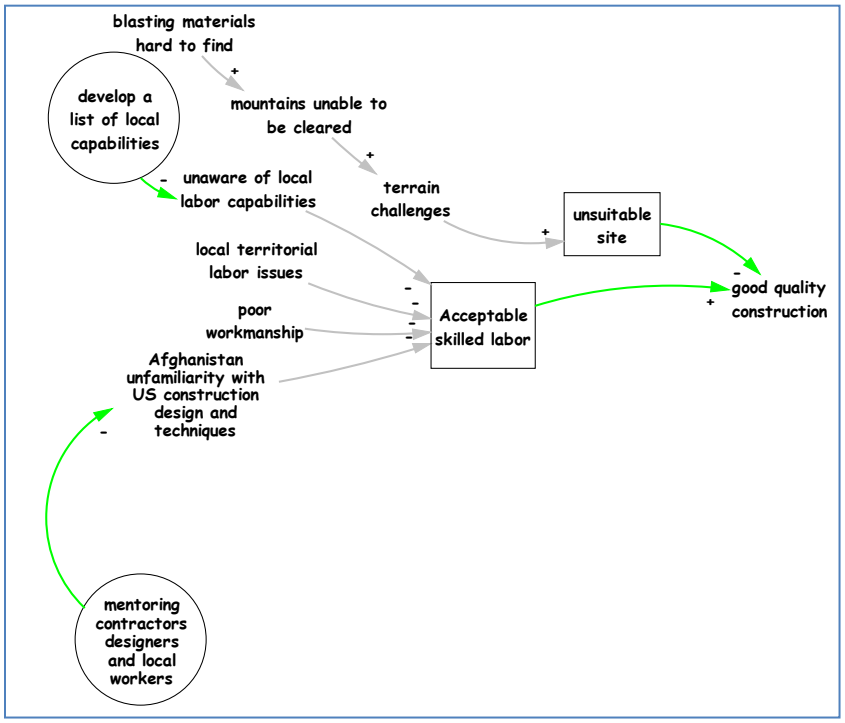

Figure 8. Solutions for labor and unsuitable land issues. (Gray arrows represent the previous story.)

7.1.2.3 Solutions for Skilled Labor and Unsuitable Land

One way to familiarize local workers with U.S. design and construction techniques is to provide more mentoring opportunities for contractors, designers, and local workers. Two respondents suggested that a list should be developed of all local labor capabilities (Fig. 8). Such a list would increase the awareness of local

resources and improve the availability of acceptable labor. These solutions will potentially reduce the number of unsuitable sites, increase the amount of acceptable labor, and ultimately improve the quality of our construction projects.

7.1.3 Poor Design and Finding Good Quality Materials

7.1.3.1 Poor Design

Respondents cited several reasons why projects have been poorly designed (Fig. 9). Challenges with identifying qualified and skilled labor, unfamiliar with U.S. design and construction techniques, has a direct influence on construction design. In addition, it was argued that designs for austere conditions or site-adaptations were not well thought out. Although implementation of site-adapt as a delivery mechanism has improved construction process and execution of projects, some modifications of facilities are required in other parts of the country. A lack of knowledge and historical information concerning existing physical conditions at work sites also led to poorly designed projects. In cases where "as-built" drawings are missing, it becomes increasingly more difficult to maintain continuity in the region, which makes the design process less efficient.

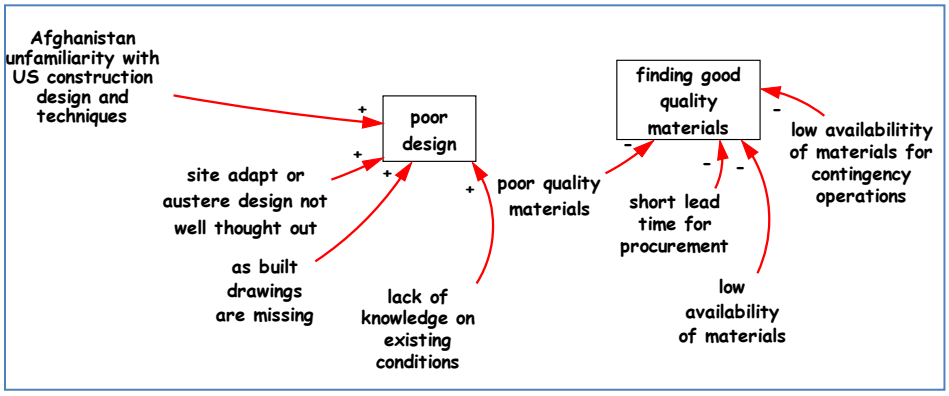

Figure 9. Issues of poor design and material quality.

As discussed in previous section, design-build was used initially in Afghanistan but did not work well. Eventually, site-adapt was implemented on construction projects. Site-adapt means the government agency provides the design, plans, and specifications of the structure and conducts the RFP. The contractor can be changed, and modified the site design of exterior utilities to adjust for site conditions.

7.1.3.2 Finding Good Quality Materials

The quality of materials used affects the outcome of a construction project. Finding acceptable quality materials has been a challenge in Afghanistan (Fig. 9). Five respondents discussed how poor quality materials in the region have created problems during design and construction. In cases where good quality materials were available, the quantity has not been sufficient to deliver consistently high quality construction projects. A lack of documentation for contingency operations was expressed as another obstacle to finding good quality materials. Time pressures, the short lead times for procurement, further constrained the effort required to obtain good quality construction materials. Thus, even if those materials had existed, they would have been difficult to obtain.

7.1.3.3 Solutions for Poor Design and Quality Materials Issues

Figure 10 highlights several solutions proposed by respondents to resolve the poor design and material availability issues: 1) mentoring contracts; 2) regional site adapt design; 3) use local materials of acceptable quality; 4) adjust codes; and 5) monitor contractor performance

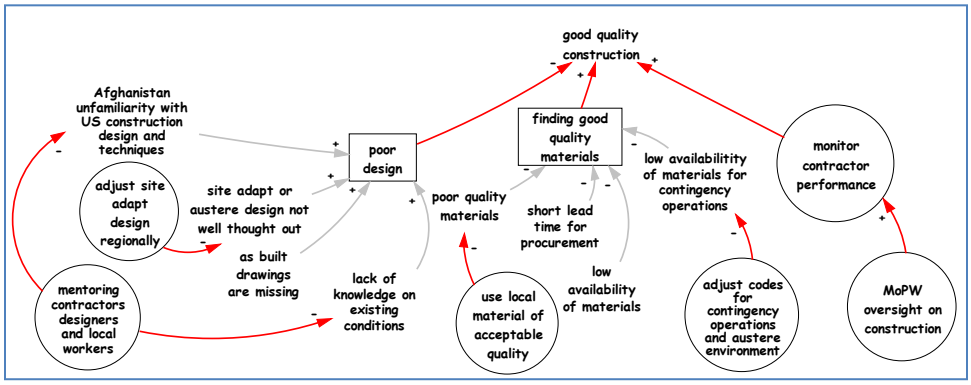

Figure 10. Solutions for poor design and quality materials issues. (Gray arrows represent the previous story).

Several respondents (13) suggested mentoring contractors, designers, and local workers as a solution. Mentoring would build relationships and would 1) reduce local unfamiliarity with U.S. design and construction techniques, and 2) improve our knowledge of existing conditions. Both of these would help improve the quality of design and construction. To address the concerns that on-site adaptation and austere designs were not well thought out, respondents proposed that designs be adjusted regionally. This additional step for design would avoid project rework and redesign under the current "one size fits all" approach. Using local materials of an acceptable quality (and defining new measures for "accepta-

ble"), the level of poor quality materials would be diminished, and time and effort for construction would be reduced. Documentation of materials for contingency operations and the austere environment with code revisions would help alleviate some of the low quality material issues. It would also reduce the amount of time it takes to find and collect these materials.

There were two suggestions to help maintain performance for high-quality construction projects. An oversight mechanism to monitor contractor performance would guarantee some accountability in the system. Following on this suggestion, representatives from the Ministry of Public Works voiced a desire to be involved in this oversight to guarantee local ownership in the process.

The entire perspective for the problems and solutions indentified for design and construction is shown Figure 11. The causal analysis provided three major stories highlighting the design and construction theme. Interviews revealed issues where unfamiliarity with U.S. construction design and techniques affects acceptable skilled labor, and affects design and quality of construction in Afghanistan.

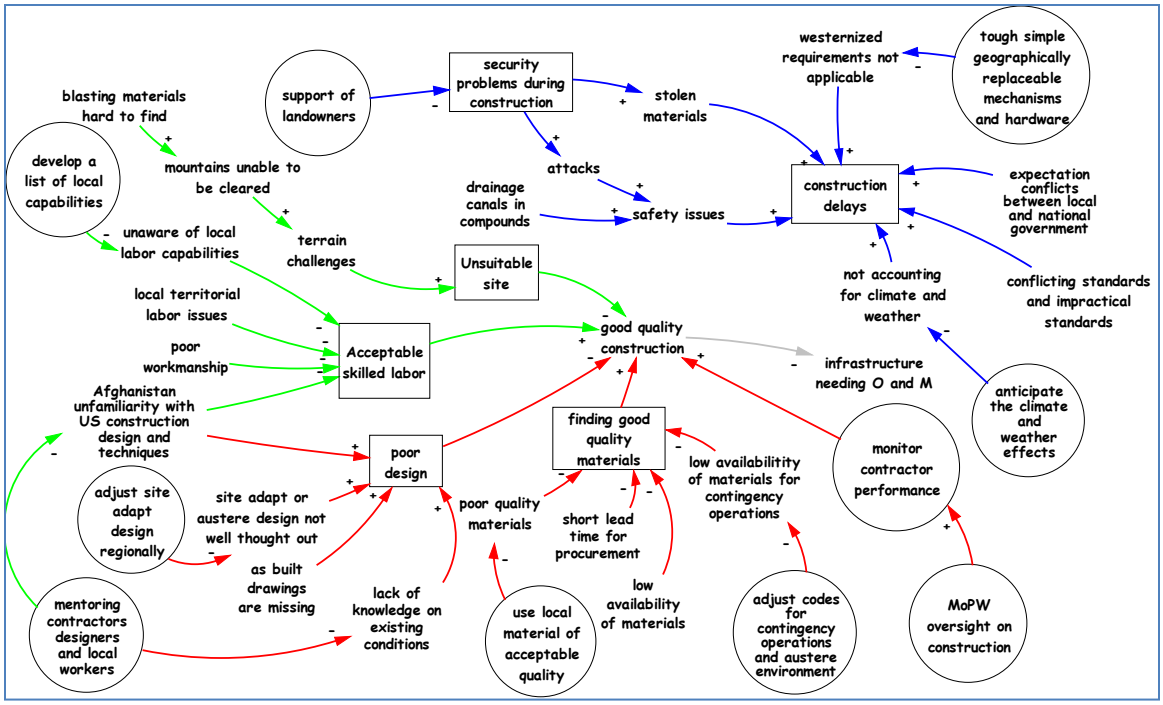

Figure 11. Solutions for poor design and quality materials issues. Causal map representing three story lines (in three different colors).

7.2 Cultural

The responses revealed two general cultural issues: immediate issues leading to scheduling delays and long term issues leading to sustainability problems.

7.2.1 Immediate Issues

7.2.1.1 Schedule Delays

Cultural issues that lead to scheduling delays could take several forms (Fig. 12). The most pervasive issue in the responses was security, and cultural aspects of this concern were no exception. Tangent to the security issue was concern for theft of property that potentially can cause scheduling delays. When a contractor made an effort to complete work on time, there were some success stories. However, cultural norms revealed that local workers were not accustomed to rushing through work or responding to job performance measures. Even in circumstances where there was local commitment, scheduling delays could exist when tasks were beyond local capacity. Cultural impacts on scheduling delays were also caused by a lack of written schedules for some of the projects. In addition, schedules needed to be shifted unexpectedly to account for local holidays that were not previous recognized.

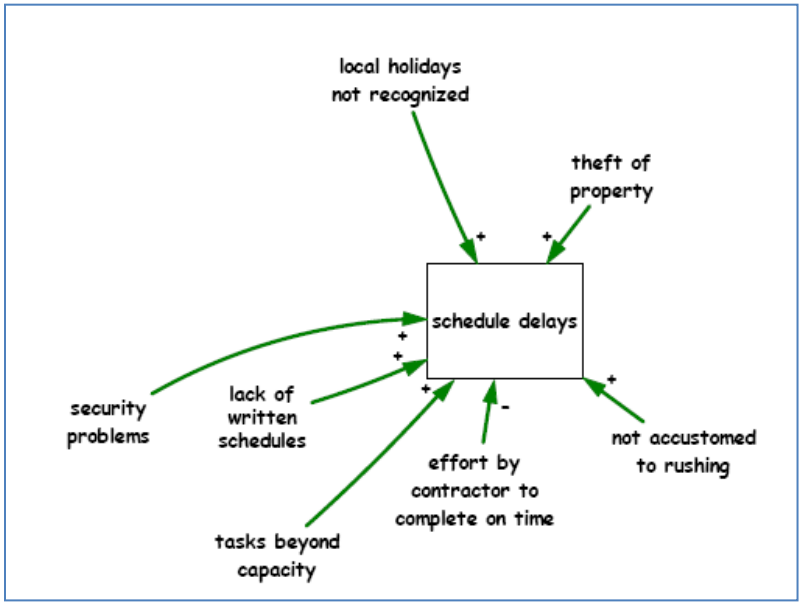

Figure 12. Issues related to scheduling delays.

7.2.1.2 Security Problems, Tasks beyond Capacity, on Time Contracts

Respondents reported some job safety issues in the interviews. In particular, data showed that some local workers were unable to safely operate machines and

equipment (Fig. 13). The territorial and inter-village conflicts, which plagued labor issues for design and construction, also caused some potential scheduling delays. Cultural biases against workers perceived as helping the coalition resulted in threats and intimidation tactics (Fig. 13). While eagerness is often perceived as a positive trait, this has resulted in a level of over-commitment by Afghan workers. This has increased the number of tasks taken beyond local capacity. There was a sense that cultural beliefs regarding work as a "favor" to the employer reduces the level of effort by contractors to complete projects on time. In addition, contractors who believe contracts have no legal weight or significance are less likely to put forth the effort required to complete a contract on time.

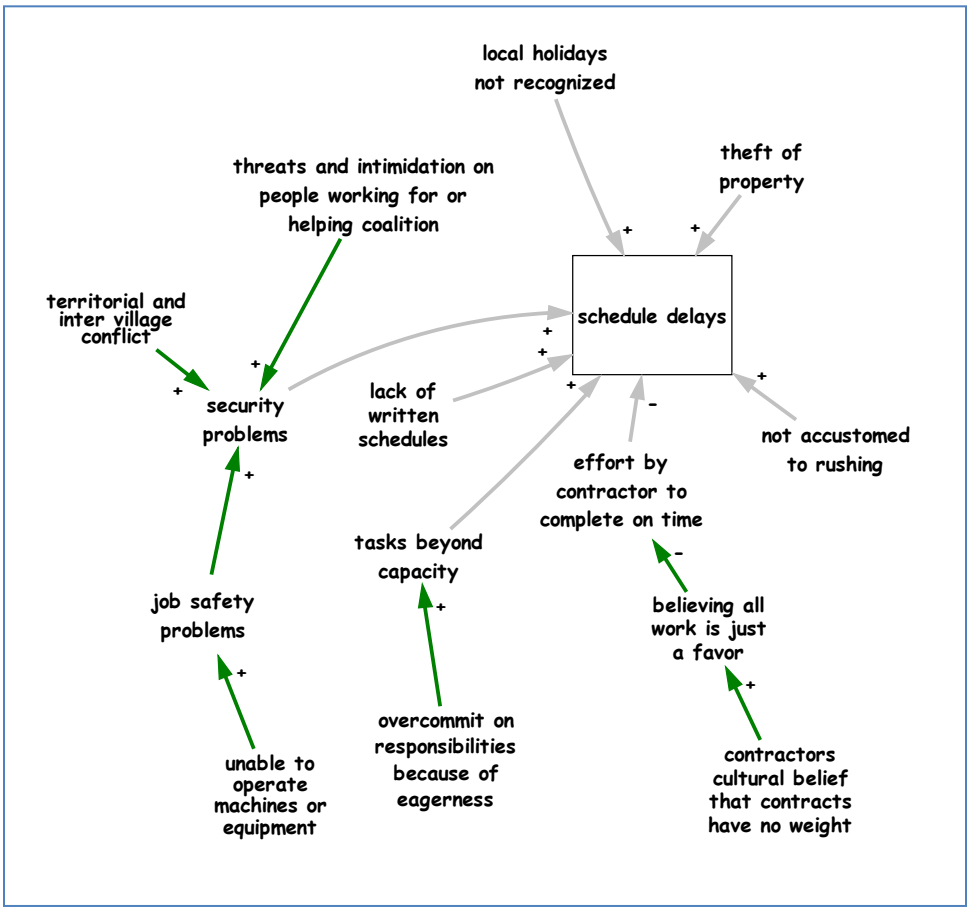

Figure 13. Issues related to security problems, tasks beyond capacity, and contracts on time. (Gray arrows represent the previous story).

7.2.1.3 Solutions for Schedule Delays

Training courses for local workers in job safety and familiarity with machines and equipment were suggested as ways to minimize injuries and scheduling delays. In instances where theft was a concern, respondents proposed that laws be adopted to protect individuals and their personal property (Fig. 14). These solutions lead

to more attention to these cultural issues, which may decrease scheduling delays and increase the number of on-time, high quality projects, which ultimately benefits long term development.

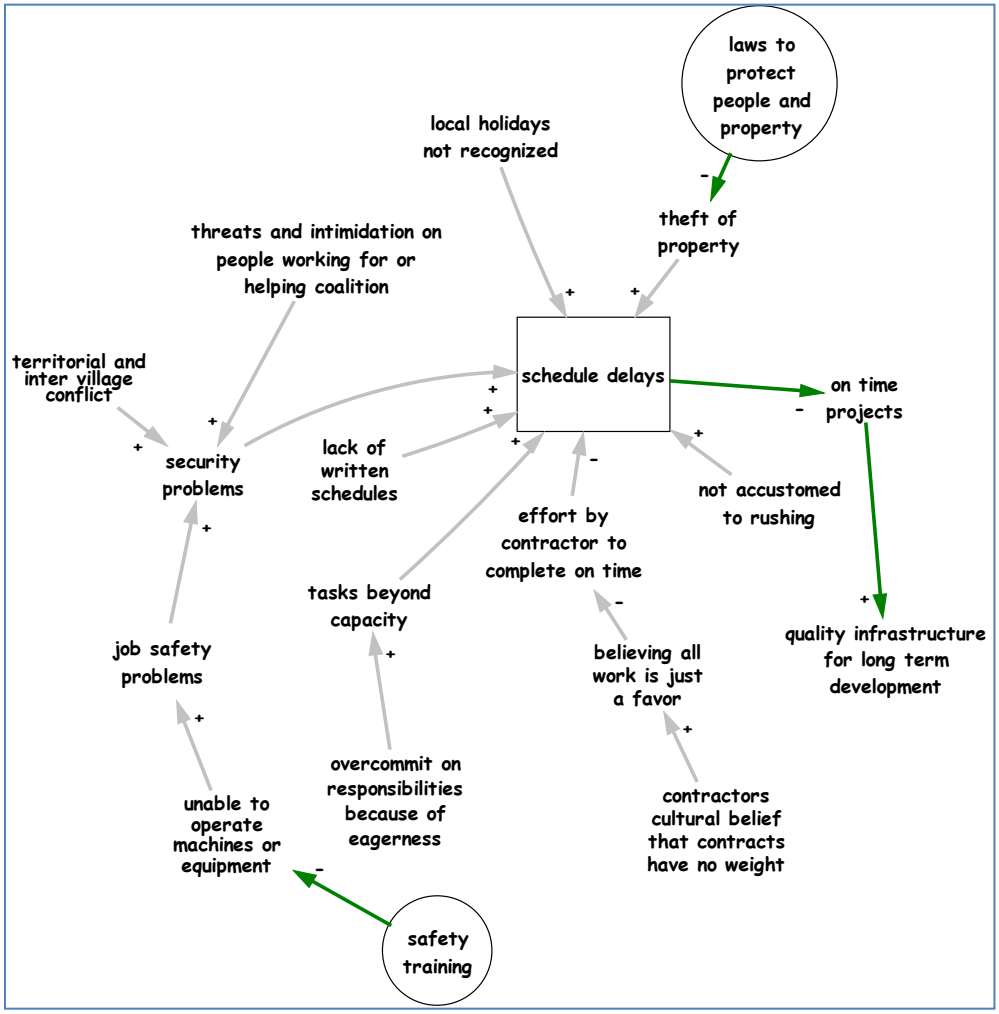

Figure 14. Solutions for schedule delays. (Gray arrows represent the previous story.)

7.2.1.4 Capacity for Sustainable Development

In addition to scheduling delays, cultural issues influence the prospects for long-term sustainable development (Fig. 15). While Corps projects can have a positive effect on sustainable development by stimulating economic growth, some cultural factors can diminish this potential. Capacity development for project management also helps sustain development in the region. On the U.S. side of the equation, it is important to maintain coordination between Americans and Afghans to sustain development and growth in the region. The potential for sustainable development may decrease in cases where Afghan people are unfamiliar with western facilities and solutions.

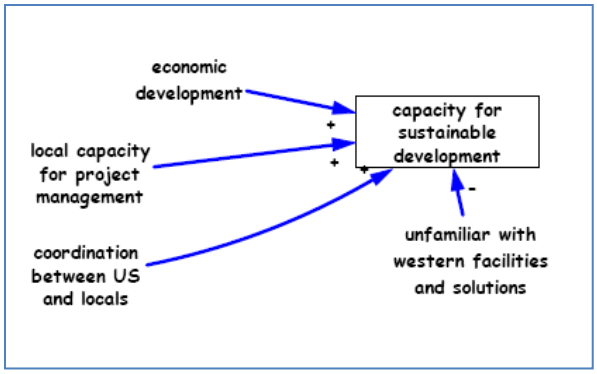

Figure 15. Capacity development.

7.2.1.5 Economic, Capacity and Coordination

Sustainable development has potential obstacles in several areas: 1) economic development; 2) capacity for project management; and 3) U.S.-local coordination. In a nation fragmented by differing cultural beliefs, the history of military conflict confounds U.S. efforts for economic development (Fig. 16). In addition, respondents suggested two general types of project management barriers: 1) direct language barriers leading to miscommunications; and 2) contractors reporting what they thought U.S. officials wanted to hear, instead of actual progress. The issue with miscommunication from the language barrier also reduces the U.S. ability to coordinate with local Afghanistan communities.

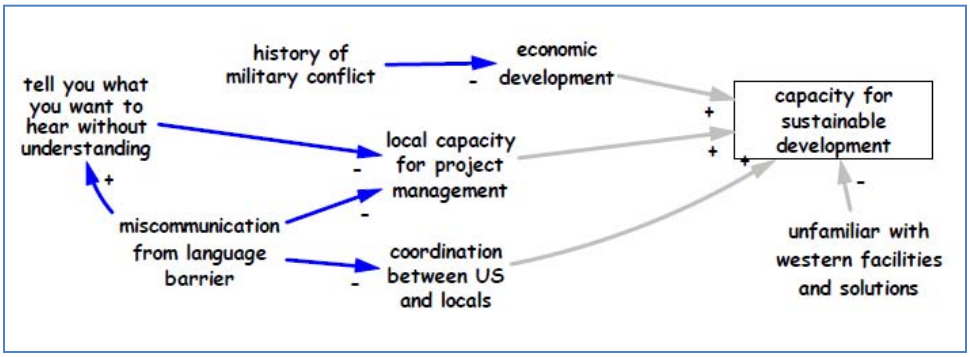

Figure 16. Issues on economic development, capacity for project management, and U.S.-local coordination. (Gray arrows represent the previous story.)

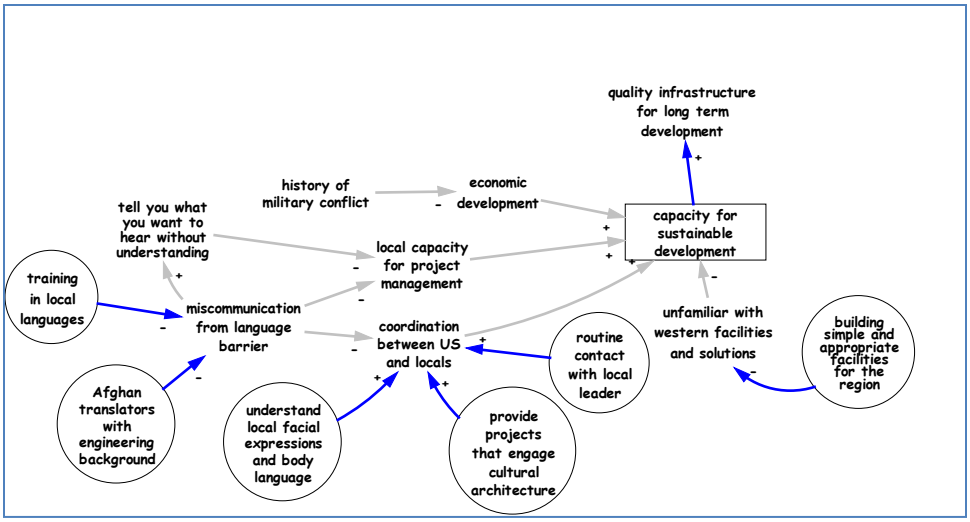

Figure 17. Solutions for building sustainable development capacity. (Gray arrows represent the previous story.)

7.2.2 Solutions for schedule delays and capacity development

The responders suggested a few ways to increase the capacity for sustainable development. For example, in cases where locals are unfamiliar with Western designs, they suggested that buildings be constructed more simply and appropriately for the region (Fig. 17). There were several suggestions that may help build coordination between the U.S. and (local) Afghans. First, routine contact with local leaders would build trust and confidence. Second, projects that engage cultural architecture would show respect for the local history. Third, a cultural understanding of body language and non-verbal communication would improve relationships in the region. Miscommunications between the U.S. and Afghan people can be alleviated in a couple of ways. First, we should incorporate Afghan translators with an engineering background in phases of the project. Second, training programs in local languages would increase communication channels. Cultural issues cause schedule delays (Fig. 18).

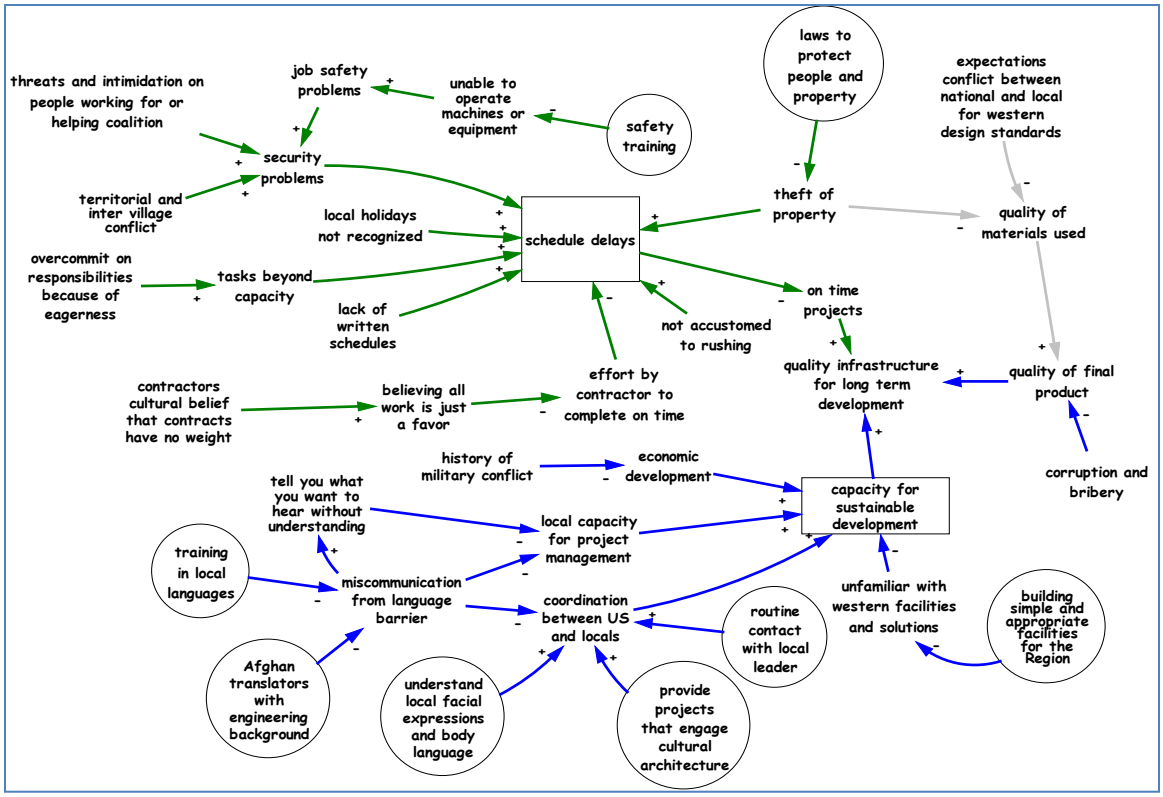

Figure 18. Causal map for cultural issues.

8 Successful Versus Unsuccessful Projects

Based on the challenges listed in previous sections, success attained was at various levels. One of the responses implied that a successful project was difficult to measure and stated that: "In Afghanistan, success was measured against three factors: time, cost, quality (in that order). Delivering projects on time was the most important factor, as we are in a war against an enemy and the facilities were needed by the soldiers fighting the war." The projects' success or lack of success depends on the responders' role and responsibility.

8.1 Successes

Seven responses defined project success using criteria such as completion of the project on time and on budget, conforming to U.S. standards, and meeting all requirements in the contract with good quality construction. This input came from USACE project engineers, Afghan contractors, and U.S. firms.

Five responses defined successful projects as those with proper and extensive oversight, expectations that were discussed, and concerns that were promptly addressed. This input came from U.S. military project engineers, and USACE staff.

Two responses described success on a project while managing contracts. Success, in this case, meant that the contractors finished the projects on time. These projects were awarded to Turkish and British contractors.

Two responses from Afghan contractors indicated that success was based on delivering the project on time. However, this required good management and best planning practices for construction activities.

Two Afghan contractors described the success of the project as the goal. One of the firms indicated that his contracting company had qualified staff with experience in construction, while the other had a strong team of engineers and management staff, and a company with a good financial situation.

One USACE engineer indicated that the success of his project was driven by delivery of the project on schedule. This happened because of successful coordination between stakeholders and the landowner.

One Afghan engineer mentioned that he succeeded on his project by having a strong project team with the interest and coordination with PRT and local government. He felt this was a strategy for a successful outcome.

8.2 Unsuccessful projects

Two unsuccessful projects resulted from prime contractors with unacceptable building practices; later discovery showed that they were incapable or unwilling to build according to contract. These were input from USACE and U.S. military engineers.

Two other unsuccessful stories came from the contractor's culture (i.e., corruption) and lack of qualified and experienced professional personnel in the field.

One other unsuccessful outcome was projects awarded to U.S. firms, according to a USACE contracting officer. The projects were finished very late. They were expensive and many claims were filed but eventually the project was completed.

8.3 Partially successful

Other responders defined varying degrees of success on projects. Generally, construction engineers, managers, and contractors (for the most part) have viewed finishing the project on time, on budget, and to the appropriate quality level as success. Challenges have been faced, making the projects partially successful.

Five of the responses indicated partially successful projects. These were the results of contractors that are overcommitted (USACE input, U.S. contractor). Lack of success stemmed from everything ranging from bad security to a lack of qualified sub-contractors. Some of these projects were funded and built by various agencies and are now managed by Afghanistan Ministry of Public Works (MoPW) for operations and maintenance (O&M). These projects had problems during construction that are now affecting O&M.

Other responses did not indicate whether or not the project succeeded. A few of these projects were on-going when the inquiry was conducted.

9 A Customer Perspective

Some projects executed and managed by USACE and other construction staff were funded by the Combined Security Transition Command–Afghanistan (CSTC-A). CSTC-A coordinates with NATO Nations and Partners, international organizations, donors and NGO's (Non-Government Organizations) for reconstruction efforts in Afghanistan. CSTA-A supports GIRoA (Government of the Islamic Republic of Afghanistan) as it generates and sustains the ANSF (Afghan National Security Forces), develops leaders, and establishes enduring institutional capacity in order to enable accountable Afghan-led security (http://www.ntm-a.com/, accessed September 2010).

The lessons learned responses relevant to Afghan National Police and Afghan National Army facilities were primarily funded by CSTC-A. The problems or challenges emphasized at the customer's level were quite complex and included the dynamic of the requirements, the time to determine the appropriate locations of where these facilities will be built, giving the diverse coordination required to have control in the process of assessing threats and right locations and real estate, and meeting demands. Certain solutions have been highlighted, assuming risks in the process an indication of success has been achieved where facilities are being built and occupied. CSTC-A input is summarized in the following discussion.

9.1 CSTC-A determines sheltering/basing solutions

As mentioned earlier, sheltering or providing military and Police facilities is one of the major missions of CSTC-A. Sheltering solutions are determined based on the following. 1) time between identification of requirement and need of facility, the type of mission, and longevity of need for the mission; 2) facilities to meet a wide spectrum of needs. These needs can range from temporary to permanent structures.

9.2 Dynamic basing requirements create uncertainty in the planning process

CSTC-A has an accelerated timeline and growth model for Police and Army units; however, the facilities they require are not available yet. To meet their need, CSTC-A used every option, including the use of existing facilities, tents, connex facilities, and new brick and mortar structures for facilities.

A transition requirement from the use of connexes or tent as temporary facilities to brick and mortar, used in permanent or enduring facilities, needs to be addressed. Housing in temporary facilities is seldom considered in the original design, often because these are needed to emerge through operational necessity and are planned independently of the facility planning cycle.

The location of enduring facilities for the forces often took time, not because they are built in the slower phase, but because the operation changed over time. Operationally, units needed to be in different locations based on threats and this was often incompatible with the location chosen.

CSTC-A focused meeting the ANA and ANP needs with brick and mortar facilities that met the operational commander's objectives. Funds diverted to temporary facilities, such as tents and connex facilities, took valuable resources away from the establishment of long-term permanent facilities.

Large tent cities or a tent shelter configuration for a battalion could range in excess of $3 million and connex facilities cost on the order of about $5 million. CSTC-A spent a good amount of money for temporary construction. CSTC-A could better respond to emerging requirements by obtaining predictability for the locations. This would alleviate the use of temporary shelters in favor of enduring facilities.

Counterinsurgency (COIN) operations required a unique approach to planning, designing, and executing enduring facilities within this dynamic environment. COIN operations involve surges of transient units of ANA and ANP in focused areas that require facilities for temporary periods of time. These temporary needs cannot be overlooked.

9.3 Process to Meet Requirements (Control in the Process of Assessing Threats, Locations)

CSTC-A responds to changes in requirements, whether it is a new location or reflagging of units. The Afghanistan Ministry of Defense and Ministry of Interior (MOD and MOI) often determined the location and reflagging of units based on the regional commanders' threat situation. This process of determining a location by these agencies impacted CSTC-A's ability to construct an enduring facility, resulting the use of temporary facilities.

The acquisition of land was often the greatest hurdle to overcome. Determining who owns the land is often complicated. The deeds to land within Afghanistan changed from government to government multiple times. As a result, GIRoA land is always in dispute. Each previous government did not enforce land ownership rights and therefore records are not always available. GIRoA has a challenging task when attempting to acquire real estate, especially when determining the location of a unit to meet tactical needs. This could be the reason why site assessment is limited.

9.4 Coordination and Communication with Local Nationals

CSTC-A, working in concert with GIRoA, has identified a process for resolving land acquisition disputes through a Shura. A Shura will bring all interested parties together and identify the property owner, document the results, and then GIRoA can proceed with providing direction to CSTC-A on locations for enduring facilities for ANA and ANP units.

Through the partnership with GIRoA and CSTC-A, several imperatives and initiatives have been developed to promote transparency, transition, leadership development, and Afghan responsibilities and assuming the risk for country sustainment. As these affected projects, the imperatives and initiatives are elaborated as follows:

- Transparency—U.S. forces need to be transparent in the decision making between ANA and ANP units with MOD and MOI. There's a reason why the Afghan commanders want to be in certain locations (mission requirements affect the quality of life of Afghans). They know their country better than we do.
- Transition—Afghans need to be part of the solution and involved in the decision making process. As the U.S. transitions operations and facility construction processes, they will need to continue well after the U.S. departs. It can be pretty frustrating at the moment, but this needs to happen early on, not just at the passing of the baton in the end.
- Leader development—CSTC-A recognizes that maintaining the infrastructure is critical. Contracts are in the process to facilitate Operation and Maintenance of infrastructure.
- Causes of attrition of Afghan Forces—Afghans assume a risk in their quality of life for using existing facilities (i.e., those affected by war, damage, or are unsafe because of the lack of construction standards); these can be facilities that are of poor quality and that we accepted as is. Doing this is puts soldiers at risk and influences ANA and ANP attrition.

- Transferring ownership—It's important to seek partnership with locals at ANSF level so that operations and maintenance can be procured through local Afghan contractors.

9.5 Cultural Issues

Tents are not ideal because of the quality of life. There's a cultural perception. Tents are not viewed as enduring for a country that has gone through multiple transitions and governments. Afghans want something for longevity, and enduring facilities provide this need.

Corruption is part of the culture; everybody involved in the project is going to benefit by paying off. A certain percentage of money is being used for pay-off; thus, this affects the outcome of the project. This type of corruption is not in the contract or is not estimated in the projects.

9.6 Safety

Tents catch fire on occasion (from cooking and smoking). Tents are not a permanent solution but are expedient.

9.7 Design

The USACE is working to develop a standard austere design, but there need to be exceptions. For example, the standards can incorporate regional or climatic factors.

Regional austere designs do not fit in the U.S. paradigm for counting or estimating materials for construction. For example, how does one account for adobe brick, mud, and straw with chicken wire about 1 m thick? How does an engineer dictate these requirements in a contract as a standard? Currently, it is difficult to set that standard for accountability.

9.8 Potential Solutions for Design

CSTC-A has expressed several potential solutions to tackle design challenges. They include:

- Take out air conditioners and use fans instead. Make sure that kitchens have the capability of burning wood not just propane.
- There must be a balance between adapting Afghan-type construction and U.S. quality standards that will endure to some degree.

- Examine the desirability of enduring versus less enduring facilities (Afghanistan has an endless labor supply). It may be easier and cheaper to build something less durable that can be constructed again in 10 years than to build something that can't be maintained under current operating and maintenance contracts.
- A regional assessment needs to be used to identify resources of the area (i.e., materials, energy, and labor). This assessment will provide an understanding of how a requirement can be designed to meet the conditions in which it will be built.

9.9 Construction

Executing a construction project with the Corps has some significant challenges, including keeping up with schedule and implementing lessons learned. Keeping up with schedule and funding (use of expedient methods of obligating the money, and losing control of how the money is spent by contractors; i.e., corruption) are concerns raised by CSTC-A. Delaying the implementation of lessons learned will influence a design. Lessons learned take time to collect, analyze, and implement, and often take over a year to be incorporated into the new designs. This lag means that the immediate projects in the next 6 to 12 months will not be adapted owing to the extensive rework often required. In addition, a balance between meeting the commander's operational needs and incorporating revisions in projects from lesson learned is required. Some facilities that are built and occupied exceed the capacity for which they were originally designed.

9.10 Contracting Challenges

Within this theater, it is extremely difficult to obtain qualified contractors to meet the needs specified in a contract. The U.S. process is complicated. It uses an extensive process to develop a statement of work, solicitation, and pre-awarding. USACE is building a database of qualified contractors to grow the base of in-country construction capability; however, there is still a lack of contractors that can execute projects.

9.11 Quality Assurance, Project Oversight

Security is one of the key challenges where projects are often built in areas with minimal safety. Construction requires oversight, and the ability to enforce or identify deficiencies is limited if an inspector cannot get to the site. This limits the amount of effective oversight.

9.12 Coordinating Efforts

The interaction between customers, end-users, and project managers is improving. Getting USACE to provide oversight and assist CSTC-A is a great example of this and is critical for the mission. CSTC-A relies on USACE for execution of projects and this relationship requires coordination. Building by Afghans is an initiative developed by Integrity Watch, an NGO, and is a significant collaboration.

9.13 Indicators of Success

CSTC-A is still successful in placing facilities on the ground and folks are occupying them. The good news is that we have not delayed the generation of forces because of a lack of facilities. We assume some risks to move very quickly, but attempt to ensure that the facilities meet minimum standards.

10 An end-user's Perspective (U.S. Military Personnel Who Mentor Afghans)

The international coalition in Afghanistan has been working to provide facilities to train and house the ANP. One of the requirements to meet the ANPS's growing need was the construction of the Joint Regional Afghanistan Security Forces Compound (JRAC) in Kandahar. CSTC-A provided $45 million to USACE to fund the construction of the compound, which is located outside the Kandahar Airfield. The compound consists of four separate ANP projects: a Regional Logistics Center, an Afghan National Civil Order Police battalion, the Afghan Uniform Police's regional headquarters, and the Afghan Border Police's zone command. USACE executed a firm, fixed-price contract for the Regional Logistics Center project and a firm, fixed-price contract for construction of the projects for the Afghan National Civil Order Police, Afghan Uniform Police, and Afghan Border Police:

http://www.sigar.mil/pdf/quarterlyreports/Jul2010/SIGAR_July2010.pdf

The results below summarize an end-user's perspective, including existing discontinuity of staff and lack of documentation as requirements were developed, the use of site-adapted designs with disregard to regional suitability, having insufficient oversight for construction projects, as well as many other challenges.

10.1 Requirements

Documentation was lacking or corporate knowledge was lost because of the constant rotation of personnel in and out of theater. These issues affected the requirements and development processes in the JRAC and adjustments were needed, ranging from planning to execution documents.

10.2 Design

Input for the JRAC did not consider Afghan-specific requirements or local conditions. Current policy stated that construction would meet basic requirements only. This prohibited installation of air conditioning in facilities not considered essential. In the Southern Region, however, where extreme heat exists (often greatly exceeding 100°F [38°C]), the lack of air conditioning would be detrimental to the users after the facility is completed. The users were not consulted or policy was blind to meeting specific regional issues.

10.3 Construction

Construction delays and deficiencies occurred on JRAC projects. “Probably the most detrimental aspect of how USACE manages projects in Afghanistan (using JRAC as an example) was the tendency to rapidly turn over Project Managers,” according to the interviewee. Thus, this resulted in a broken system of continuity of effort, causing confusion and lack of oversight for the project. Personnel were in transition as USACE-AES was in the earliest stages of organization. Many members of the staff were relocating or redeploying.

10.4 Contracting Challenges

Current processes for modifying contracts are cumbersome and not responsive enough for rapidly changing operational requirements. Site and project managers often ineffectively addressed contract authorities to meet these changing requirements.

10.5 Coordination Issues

The USACE unclassified network does not interface with the military unclassified network in Afghanistan. The military operates on @afghan.swa.army.mil whereas USACE operates on @usace.army.mil . This results in the inability to query personnel in a global directory across domains, which would facilitate communication. Communication is further hampered at some locations when military systems are accessed only occasionally. If as individual is gone, there is no way to know who another USACE POC might be.

Finding a middle-ground between need and capability is only effective through a solid relationship with our Afghan counterparts. Develop the relationships with the Afghans first. Only through this relationship can we effectively influence the Afghans to participate in the planning process. The relationship building takes time, so this must happen early to identify Afghan needs. The Afghan will assume responsibility when he can see no intent of ill will or a hidden agenda.

10.6 Indicators of Success in the Process

In spite of continual construction challenges, new facilities have been built to house the ANP. Higher standards have been maintained and this is an indication of success that does not account for being on-time or within budget.

11 Summary and Lists of Considerations

Experiences and lessons learned from construction projects in Afghanistan were collected via questionnaire responses and interviews from professionals, contractors, and donors. Their responses provided insight and knowledge about programming and contracting awards, planning and site assessments, design and construction, selecting materials, ensuring quality control and quality assurance, training and education, and maintenance and operation of infrastructure. The data collected were analyzed by summarizing the responses in phrases expressed as a problem (an issue) or a solution. The summarized phrases were tallied for a frequency analysis of problems and solutions. There were 245 total phrases, capturing both problems and solutions. The phrases were clustered on the basis of common terms that were then subject to interpretation by the authors.

The direct and indirect impact analyses provided information on problems that produced significant consequences affecting other aspects or themes. An example was security during site assessment and planning. A problem expressed was *Security hinders access*. This particular problem has a significant *direct* impact on design and construction and an *indirect* effect on contracts, materials, and quality assurance and quality control.

Creating the categories allowed us to understand where major project problems or solutions occurred. The categories identified the major issues' frequency: the construction process itself, followed by schedule, security, and safety. These challenges have cascaded, affecting materials used, limited coordination, shortage of local expertise, not accounting the environmental conditions, lack of rule-of-law, and lack of knowledge and data. In the solutions category, the construction process had the highest frequency. This was followed by sustainability, which was followed by coordination, improving local expertise, and using appropriate materials for the region.

A particular issue can either increase or decrease the severity of another problem. The issues that we examined, in most cases, exacerbated other problems. At the same time, any particular solution typically outlined effective approaches to resolving multiple linked problems. The causal analysis provided three major stories about the design and construction theme. These major stories showed various influences on construction delays, security problems, labor and land suitability, design and finding quality materials. Therefore, causal mapping

helped identify the root cause of the problems and the best approach for solutions.

Using lessons learned can have a positive, pre-emptive effect, allowing us to avoid or minimize unintended consequences while formulating requirements, planning, making contracts, designing projects, and constructing them. Our list of considerations has pin-pointed key problems and solutions. These are highlighted below.

11.1 Contracting

Problems in contracting have been identified. These concern management decision process or procedures, mechanisms and tools for tracking progress, resources, and government staff. Significant contracting issues are as follows:

- Short deployments and limited overlap with predecessors.
- Contractor qualifications (credentials, past performance, personnel, etc.). Be cautious in this environment. It can be very hard to verify these claims when problems are encountered.
- Simplify acquisition processes for contingency operations and smaller projects.
- Awarding single contracts to local firms for work at multiple sites has been problematic.

Selected contracting solutions are building Afghans' technical capability, establishing appropriate contracting durations, and improving processes and procedures. These significant contracting solutions are enumerated as follows:

- Try to employ local labor frequently, as close as possible to their home villages. It has helped with better security and "buy-in."
- Hire local nationals to support the USACE contracting office for continuity and teach contracting processes, ethics, etc.
- Customers drive unrealistic contract durations; they require work to be completed faster than existing conditions in Afghanistan will allow. Better ways are needed to determine reasonable performance periods, with proper time and cost allowances for weather, security, local holidays, etc.
- Local firms and contractors need projects with complexity and scale appropriate to their ability and resources. This will help develop local capacity, jobs, and experience.

- Identify a specific group early in the process that will be responsible for Operations and Maintenance.
- Seek out and incorporate in-country "boots on the ground" engineering feedback when making program or project decisions.
- Design-site-adapt contracts worked well. Harmonizing the contracting process with other donor organizations could lead to better outcomes.

11.2 Cultural

Major cultural problems are local beliefs, practices, norms, philosophy, views, and outlook. These include:

- Job site safety is a major problem. Afghans have a very different viewpoint of risks posed by construction equipment, electrical hazards, etc.
- Corruption, bribery, theft, threats and intimidations for helping the coalition, and inter-village conflicts are common problems.

Cultural solutions emphasize in the following:

- Afghans are not accustomed to western facilities and solutions. Build simpler facilities appropriate for the austere conditions. Features that require cultural sensitivity include: toilets, morgues, ablution areas, covered sitting and garden spaces, space for mosques in compounds, large open meeting rooms for shura/jirga, and outdoor cooking pits.
- Working safely needs to be emphasized and frequent reminders are needed.
- Purchase local materials and use local businesses to promote job creation, local economy, and community involvement.

11.3 Design and Construction

Problems in design and construction include security, specification and standards, and quality of materials, and are explicitly featured as follows:

- Major security problems often happen during construction. These include attacks, material theft, and territorial issues between villages over labor.
- Many current design and construction standards are not practical for contingency operations and austere construction environments.
- Anticipate a variety of climate and weather conditions. Challenges frequently encountered have been drainage, erosion, rain, and snow or cold in the mountains.
- Finding quality materials has been problematic.

Solutions identified in design and construction include the following:

- Austere designs (e.g., site-adapt design) with tough, simple, locally replaceable mechanisms and hardware are more appropriate than westernized solutions in many cases. These must be applied thoughtfully.
- Afghans may be unfamiliar with western design and construction techniques. Be aware of local capabilities in which they excel, such as stone masonry and concrete work.
- Allowing for adequate lead times to procure materials is important.

11.4 Education

Education considerations are stemmed from the country's lack of technical capabilities. These include:

- Limited local capabilities and resources for infrastructure operations and maintenance.
- High USACE personnel turnover, rest and recreation (R&R) periods, and overtasking hinder effective training and mentoring.

Solutions to improve education will promote infrastructure ownership and are explicitly emphasized in the following.

- Promote training partnership with local academic institutions to improve technical capacity.
- Operations and maintenance training is needed for sustainment of facilities. Try to focus on creating local instructors to continue the process independently in the future ("train the trainer").
- Hire specific personnel who can dedicate their time to mentoring and training.
- Provide training on professional-level technical and business processes. These include construction methods, planning, design, scheduling, management, contracts, ethics, decision making, and quality control planning. Incorporate both local and international methods.
- Focus more on mentoring and training, so that Afghans can take the lead for growing and improving infrastructure and developing self-sufficiency.
- Require on-the-job training. Consider a short orientation for workers before construction starts to outline project goals, government regulations, safety, technical information, punctuality, ethics, etc.
- Integrating ANA officers with USACE staff has been successful.

- Afghans should be mentored to take on a proper customer role and provide real input for decisions and planning.

11.5 Materials

Problems highlighting materials used in construction that are significant include:

- Quality of local materials varies dramatically. Concrete, bricks, and concrete masonry units (CMUs) have been especially difficult to control.
- Situations exist where higher quality materials and equipment need to be imported. Issues with this process can include long lead times, incompatibility with existing criteria and electrical supply standards, resources to check incoming quality, and variation from conventional U.S. construction methods.
- Processing submittals for approval have been delayed.

Suggested solutions are as follows:

- Close tracking of supply from approved producers and working proactively with them can be helpful.
- Quality CMU, brick, and concrete are good options for austere buildings.
- Ensure prompt and proper processing of submittals for material approval.

11.6 QC and QA

Awareness of problems with quality control and quality assurance (QC/QA) resulted in poor quality construction. These include:

- Be aware of corruption and falsified or unrealistic QC/QA reports.
- Logistics and security make access to worksites for timely inspection difficult.
- Inspection periods made available by contractors have been short, leading to unsupervised or poor quality work.

Solutions emphasized in QC/QA were to promote better construction and enhance cooperation:

- USACE efforts to inspect and approve Afghan laboratories and test equipment have been successful. Reliable facilities are now available.
- Basic familiarity of military personnel with QC could allow rough assessments in hard to reach and dangerous areas.

- Asking shrewd questions and making sure people are providing honest information, not just telling you what you want to hear, are necessary to get effective QA/QC information.
- Hiring Afghans for QC/QA and USACE training has been successful. International and Afghan inspectors partnering onsite for mentoring has worked well.
- USACE personnel with backgrounds that are different from the area they will work in need appropriate, basic QA training.

11.7 Site Assessment and Planning

Major problems with site assessment and planning are the following:

- Security problems and UXOs hinder access to construction sites for oversight and assessment of quality.
- Accurate input for design criteria and availability of skilled labor may be difficult to determine during project planning.

Solutions reiterated to improve site assessment and planning include:

- Good data management and record keeping are important to avoid loss of critical information and provide continuity for on-going projects.
- As-built drawings and closeout documents should be produced and distributed properly. Final contractor payments should be withheld until all documents are submitted.
- Determining a well-defined site location early on is important to the contracting, property acquisition, and assessment processes.
- Realize that there will be a lack of data and use what data can be obtained effectively.
- Listen to local insights about conditions.

12 Conclusion

The U.S. military, as well as civilian engineering and construction staff have deployed and redeployed since the reconstruction and stabilization effort began in Afghanistan. Discontinuities of information occur when staff members are replaced. A significant amount of knowledge and experience accumulates and the wealth of information must be gathered for in-theater best practices. Documentation of lessons learned and experiences can be disseminated to provide insight for incoming staff and used to implement a planning process for projects and to avoid or minimize unintended consequences.

The first three major problems from the tally were design and construction. These included:

- Security problems during construction (e.g., stealing materials), delays from security and attacks.
- Not accounting for climatic (weather) conditions.
- Westernized requirements not applicable in some cases.

The local nationals or Afghan engineers echoed concerns similar to those of the U.S. engineers and construction staff and international contractors. The top three issues highlighted by the Afghans included:

- Not accounting for climatic (weather) conditions.
- Security problems during construction (i.e. stealing materials), delays from security and attacks.
- Job site safety.

Several solutions were mentioned by the responders. The top three highlighted solutions are as follows:

- Mentor contractors, designers and local workers.
- Anticipate the climate and weather in design and construction.
- Adjust the site-adapt-design regionally, and modify codes for contingency operations and an austere environment.

All three of them were related to design and construction of a project.

Problems and solutions affect various aspects and stages of construction projects. Categorization enabled us to understanding where major project problems or solutions occurred. Cause and effect helped identify the roots of the problems and the best approach for solutions. Some of the problems seemed to start out as requirements developed by a customer and then propagated through the planning and contracting phases, escalating in magnitude as the project progressed. The consequences affected all involved, including the end-users, as well as the operation and maintenance of the facilities and infrastructure. Emphasis on construction success or lack of success is defined at various levels. One response implied that a successful project is difficult to measure and stated this: "In Afghanistan, success was measured against three factors: time, cost, and quality (in that order). Delivering projects on time was the most important factor, as we are in a war against an enemy and the facilities were needed by the soldiers fighting the war."

There is a vast amount of information in this report highlighting significant steps that might minimize unintended consequences. The construction challenges in Afghanistan are multi-dimensional and dynamic because of security and local capacity dilemmas and lack understanding to the local culture. However, this report suggests 1) considering culture for sensitivity and buy-in, and 2) developing technical competency to improve construction and engineering education for the local workforce by partnering with local universities. These will enhance and improve knowledge, ownership, sustainability of facilities and infrastructure, all affecting current and long-term development. Therefore, these will promote the country's security.

13 The Way Forward

Current sources for lessons learned do exist (U.S. Army 2010, USACE 2010a, USACE 2010b). However, these sources are difficult to navigate, contain static content, and have limited information related to the contents of this report. What is the best way to disseminate lessons learned? Where and how should lessons learned be implemented? The information needs to be fresh to be useful to practitioners. A dynamic framework should be instituted to facilitate and disseminate lessons learned using recent advances in collaborative technologies. These technologies are available to make it easier than ever for team members to collectively solve problems. Collaboration with subject matter experts could help to engage users in ongoing discussions, working toward solutions, and resulting in validated lessons learned. This is especially important for teams that have members in multiple countries and time zones. Such a system could become a self sustaining method to gather and share lessons learned with relevant information propagating and transmitting for various levels or users.

The concept of best practice knowledge is to connect all those involved in design, construction, planning, and processes to make effective investment decisions. The lessons learned can capture and prioritize ongoing problems and provide solutions to solve high impact, high probability events. Implementation of knowledge and insights provides for asynchronous communication and decision making, which are critical for meeting requirement and objectives. This knowledge is important as the U.S. invests in reconstruction efforts in other parts of the world.

In addition, there several other mechanisms that should be established based on the development of this study for specific applications: 1) generating scenarios before actual facilities are planned to assess the site conditions and material influence; 2) examining the uncertainty and risks with varying criteria; 3) quantifying the performance of infrastructure using adaptable construction guidelines; and 4) impact assessment of country or region stability and sustainment. All of these mechanisms are essential for planning and development, with appropriate social and cultural knowledge and fundamental engineering to apply to the changing environment, as decisions are made for civil and military purposes.

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Appendix A: Questionnaires

Introduction

This list of questions is part of an information gathering effort conducted by the U.S. Army Corps of Engineers (USACE) to compile 'Lessons Learned' into a database for engineering design and construction of infrastructure projects in Afghanistan. This Lessons Learned Database will be used as a reference for USACE Afghanistan Engineer District to develop engineering design and construction standards for Afghanistan. The questions encompass the following topics: Contact Information, General Project Information, Planning and Site Assessments, Contracts, Design and Construction, Materials, Quality Control and Quality Assurance (QC/QA), Other Project Considerations, Education and Training, and Maintenance and Operations. Please review the questions for the most recent project you were involved with. If you feel that we missed other relevant information or topics unique to your experience, please feel free to add them. We sincerely appreciate your responses to relevant topics based on your project involvement and experiences.

As a contributor, it is important to note that your contact information will not be included in the database, published, or distributed. It is collected so we may get the proper perspective on your responsibility(ies) and involvement with the project. You may use other text or a Word document to respond to our inquiries below; however, we suggest that you use this format to share your experiences and focus on your first hand knowledge.

An interview is an option if you prefer. We will contact you to schedule a time at your convenience.

If you were involved in multiple projects, please complete the inquiry twice. A first response for a project that was considered a success, and a second response for a project that was difficult or not considered a success.

که چيري تاسو په دي وروستيو کي په څو جلا جلا پروژوکي لګيا واست، مهرباني وکړی دي سروي پاڼی دوه ځله د هغو دوو پروژو په اړه ډکي کړی چې يوه يې په بريالیتوب او بله په کړاوونو او يا ناکامی سر ته رسيدلی وي.

Thank you for participating in this information gathering effort and sharing your experiences. Should you have any questions about this inquiry, please contact:

ستاسو له ګډون څخه د دی مالومانو د راغونډولو په هڅو کی او له دی نه مو چی له مونږ سره خپلی تجربی شريکی کوی مننه. د هرکومی پوښتنې لپاره چې له دي پروژې سره ټړاو لری، کولای شی په دی لاندې پته زمونږ سره اړيکه ټينګه کړی:

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او يا

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د بريښنا ليک پته: reed.b.freeman@usace.army.mil

Contact Information (your contact information will not be published or distributed)

داړيکو ټينګولو لپاره مالومات (له ټاسو سره د اړيکو ټينګولو مالومات به چاپ يا خپاره نشي)

Today's Date: --------

د نن ورځې نيټه: .....

Your name: --------

ستاسو نوم: .....

Title: --------

لقب: .....

Agency or Organization: --------

ايجنسي يا اداره: .....

Address: --------

پته: .....

Telephone: --------

ټلفون: .....

Fax: --------

فکس: .....

E-mail: --------

بريښنالیک: .....

Where is your organization based or headquartered, if other than the address above?

که چيرې ستاسو د اداري يا ايجنسي پته له پورتنۍ پتې سره ټوپيرلري، نو مهرباني وکړئ د هغه پته هم وليکئ.

General Project Information

د پروژې په اړه عمومي مالومات

1. Name of project _____

د پروژې نوم: ----------

2. Location of project _____

د پروژې موقعيت: ----------

Name of province, district, or village _____

ولايت----------، ولسوالی----------، کلی----------

Final project owner: ____ Local government ____ Province ____ Afghan National Government _____ Afghan Private Sector firm _____ Afghan Individual ____ Foreign Corporation ___ Foreign Government ____ International Agency ____ NGO or charity

د پروژې ډايلي پر محال دپروژې خاوند:_____ ځايی حکومت، _____ ولايت، _____ افغان ملی حکومت، _____ افغان خصوصی شرکت، _____ يو افغان فرد، _____ بحرنی اتحاديه، _____ بحرنی حکومت، _____ نړيواله ايجنسی، _____ غير دولتی اداره او يا کومه خيريه مؤسسه.

3. Project start date: _____

دپروژې د پیلیدو نیټه: _____

4. Project completion date: _____

د پروژې د بشپړیدو نیټه: _____

5. Project initial budget US$_____ Final cost US$ _____

د پروژې لومړنی بودجه، په امریکائی ډالرو: _____

دپروژې پایلنی ارزښت، په امریکائی ډالرو: _____

6. What was the type of construction and approximate scale? (Check all that apply)

څه ډول ودانی وه اویه کوم تخمیني میچ (سکیل)؟ (ټول هغه په نښه او یا بشپړ کړی چې د پلی کیدو وړ دي)

☐ Road	Surface type:	--------	Length (km):	--------
☐ Embankment	Slope:	--------	Volume (m^3):	--------
☐ Drainage Feature	Type:	--------	Area (m^2):	--------
☐ Retaining Wall	Material used:	--------	Area (m^2):	--------
☐ Building Facility	Type	--------	Number of Stories:	--------
☐ Dam	Type	--------	Capacity, Vol. (m^3):	--------

☐ Other infrastructure (please specify)

☐ سړک	اړدوالی (km):	--------	دسړک پوښښ:	--------
☐ د سړک خاورینه تنه	حجم (m^3):	--------	اړخي (میلان):	--------
☐ زیم ایستنه	مساحت (m^2):	--------	ډول:	--------
☐ ساتندوی دیوال	مساحت (m^2):	--------	کارول شوي مواد:	--------
☐ ودانی	ډول:	--------	څو پوړیزه:	--------
☐ د اوبو بند	ډول:	--------	ظرفیت ډکوالی (حجم):	--------
☐ نوری بنسټیزه ودانی (مهربانی وکړی وی نوموی)				

7. Was this project

☐ Successful

☐ Unsuccessful

☐ Partially successful (e.g. _____% of criteria met), why_____

دا پروژه څه ډول پای ته ورسیده؟

☐ په بریالیتوب

☐ په ناکامی

☐ څه ناڅه بریالی (دمثال په توګه _____٪ له معیار سره برابره وه)، ولی _____

8. What were the success criteria of the project, if any? Which of these criteria were met?

د دي پروژې د بريا معيارونه څه ؤ، که وی؟ له دغو معيارونو څخه کوم ئی په پروژه کي ليدل کيدل؟

9. What was your role in the project? (Check all that apply)

☐ Program Manager ☐ Project Manager ☐ Contractor

☐ Contract Supervisor ☐ Other. Please specify --------

ستاسو دنده په دی ځانګړی پروژه کي څه وه؟ (ټول هغه په نښه او يا بشپړ کړی چې د پلی کيدو وړ دي)

☐ د پروګرام مدير ☐ د پروژی مدير ☐ قرارداد ی

☐ قراردادی ځارونکی ☐ نور، مهربانی وکړی وی نوموی ----------

10. Were you involved with or overseeing multiple projects during this time?

☐ Yes ☐ No

If you answered YES:

How many projects were you involved with? _____

How many of these projects were in Afghanistan? _____

How many of these projects were successfully completed?:

Overall _____ In Afghanistan _____

د دي ځانګړی پروژې پر محال، آيا په نورو پروژو کي هم لګيا او د هغوی سرپرستی مو کوله؟

☐ هو ☐ نه

که چيری ستاسو ځواب "هو" وی:

په څو پروژو کي ټاسو لګيا واست؟

څو له دغو پروژو څخه په افغانستان د ننه وي؟

څو له دغو پروژو څخه په بريالیتوب پای ته ورسيده؟

په ټوليزه توګه: _____ يوازی په افغانستان کي: _____

Planning and Site Assessments

پلانول او د ساحې ارزونه

11. Describe the planning process for the project before construction.

له ودانولو د مخه د پروژې د پلان د پروسي په هکله توضيحات ورکړی.

12. Were the local Afghan officials involved in the planning and decision process for this project? If yes, what were their roles?

☐ Yes ☐ No

آيا د دغي پروژې د پلان او تصميم نيولو پر محال، افغان مأمورين هم په دغو پروسو کي ګډون درلود؟

☐ نه ☐ هو

13. Describe tools or methods used in the site assessment. Were they adequate to provide the information needed?

هغه اسباب او طريقی چی د ساحې په ارزونه کي کاريدلی دي توضيح کړی. آيا دغه اسباب او طريقی کافی او يا مناسبی وی چی ټول ضروری معلومات برابر کړی؟

14. How familiar were the planners with the site terrain, including topography and geology?

☐ very familiar ☐ somewhat familiar ☐ limited

How familiar were the planners with the site conditions?:
☐ very familiar ☐ somewhat familiar ☐ limited

په کومه کچه د پروژې پلانونکی د ساحې له توپوګرافی او حیا لوجی سره آشنایی درلوده؟
☐ زیاته ☐ څه نا څه ☐ لږ

د پروژې پلان جوړونکي په کومه کچه د ساحې له څرنګوالی سره آشنايي درلودله؟
☐ زیاته ☐ څه نا څه ☐ لږ

15. What information was not included in the site assessment that you would have liked to have known during the planning stage?
د پروژې د پلانولو پر محال، د کومو معلوماتو درلودل ستاسو په آند ضروری ګڼل کیدل چې د ساحې په ارزونه کې له پامه لویدلی ؤ؟

Contracts

تړونونه (قراردادونه)

16. How was the contract process executed and reviewed?

د تړون یا قرارداد چارې څرنګه اجراء او وکتل (وآزموئیل) شوی؟

17. What were the contractor's requirements to bid and how was the project awarded to contractor?

قراردادی کومې وړتیاوی باید درلودلې تر څو په بولی (داو) کې ګډون وکړی، او څرنګه پروژه هغوی ته ورکول کیده؟

18. What contract mechanism(s) was (were) employed (for example, partial payment or full payment when the project is completed, etc)?

څه ډول تړون (تړونونه) وکارید (وکاریدل)، د مثال په توګه، برخه برخه پیسی ورکول کیدی او یا ټولی پیسی هغه وخت ورکړل شوی چې پروژه بشپړه شوه؟

19. What are the advantages and disadvantages or barriers on current mechanism used for contracts (such as, funding level at which it is difficult to get funding, or if bigger projects are more difficult because they cost more)?

په اوسنی تړونونو یا قراردادونو کې کومې ګټې او ټاوانونه او یا خنډونه موجود دی (لکه، د وجه کچه چې ګرانه وی دغه وجه تر لاسه شی، او یا دا چې لوی پروژی ډیری سختۍ دی ځکه چې دوی ډیری ګرانی وی)؟

20. Did the contractor meet the requirements? If there were any disputes, how were they resolved?

آیا قراردادی ضروری وړتیاوی درلودلی؟ که چیری د تړون پر محال کړکیچونه موجود ول، څرنګه حل شول؟

21. Who was the primary contractor on the project?

د دی پروژې لومړنی قرادادی څوک ؤ؟

22. Was the prime contractor:

☐ Local ☐ Afghan national ☐ International (Country: _____)

آیا لومړنی قراردادي:
☐ ځایی ؤ ☐ افغاني ؤ ☐ نړیوال(هیواد ———————)

23. Had you worked with this contractor before:

☐ many times ☐ a few times ☐ once ☐ never

If not never: ☐ only in this country ☐ in other countries as well

آیا تاسو له دغه قراردادي سره پخوا کار کړي ؤ؟
☐ پریمانه ☐ یو څو ځلی ☐ یوازی یو ځل ☐ هیڅکله

د "هیڅکله" په صورت کې:
☐ یوازی په دی هیواد کې ☐ په نورو هیوادونو کې هم

Design and Construction

ډیزاین او آبادونه

24. Was the designer the:

☐ Funding agency ☐ Contractor ☐ Third party (specify_____)

Was the designer:
☐ Local ☐ Afghan ☐ Same country as your organization
☐ Other country (specify _____)

ډیزاین کونکی څوک ؤ:
☐ د پروژې تمویلونکی ☐ قراردادی ☐ دریم کس (څوک ــــــــــــــ)

آیا ډیزاین کونکی:
☐ ځائی ؤ ☐ افغان ؤ ☐ له ورته هیواد څخه چې تاسو یاست ؤ
☐ بل هیواد (نوم یې واخلی ــــــــــــــــــــــ)

25. What design standard(s) was (were) used? --------

کوم د ډیزاین معیار(ونه) په کار وړل شوي (ی) ؤ؟

Were changes in the design necessary during construction? ☐ Yes ☐ No

د آبادونې پر محال بدلونونه (تغیرونه) په ډیزاین کې هرومرو ؤ؟
☐ هو ☐ نه

If you answered YES:

Why were changes needed? (Please check all that apply and explain below)

☐ Materials ☐ Equipment ☐ Labor ☐ Environment

☐ Parameters used to generate design changes (measurements, estimates, etc.)

☐ Other: --------

What adaptations or new standards were necessary? --------

که ستاسو ځواب "هو" وی:

له څه کیله دغه بدلونونه ضروری ګڼل کیدل؟ (ټول هغه په نښه او یا بشپړ کړی چې د پلی کیدو وړ دي، او لاندی یې توضیح کړي)
☐ مواد ☐ سامان ☐ مزدور ☐ چاپیریال
☐ د کوم اساس پر بنسټ په ډیزاین کې بدلونونه رامنځ شول؟ (اندازه ګیری، تخمین، او داس نور.)
☐ نور .....

کومې قبولی او یا نوي معیارونه ضروري ګڼړ کیدل؟ .....

26. Was the design and construction affected by physical environment and conditions such:

Weather/Climate: ☐rain ☐frost and freezing/cold temperatures
☐heat or drought, ☐flood ☐Other:_____
Terrain: ☐ Mountainous ☐ drainage and erosion ☐ snow and ice

☐other:_____

آیا د دی پروژې ډیزاین او آبادانی د فزیکی چاپیریال له امله، چې لاندی ذکر شوی، متاثر شوی ؤ؟
د هوا حالت/اقلیم: ☐ باران ☐ پرخه او یخ وهل/ سارې
☐ ګرمی یا وچوالی ☐ سیلاب ☐ نور ــــــــــــــــــ
سیمه: ☐ غرنی ☐ زیم استنه او توګنه ☐ واوره او کنګل

27. What percentage of the work was performed using equipment: _____%, versus heavy labor.

په سلو کې څو برخی د کار په وسائیلو تر سره شو: ٪.....، د زورورو میرو په پرتله.

28. If heavy construction **equipment** was used, was it:

☐ Local ☐ Afghan ☐ International

Age?:	☐ Modern	☐ Acceptable	☐ Dated
Condition?:	☐ Good	☐ Average	☐ Poor
Reliable?:	☐ Very	☐ Somewhat	☐ Seldom
Available?:	☐ Very	☐ Somewhat	☐ Seldom

که چيري درانه وسائيل په آبادونه کي کاريدلی وي، آيا دا وسا ئيل:

☐ ځايی ؤ ☐ د کوم افغان ؤ ☐ نړيوال ؤ

عمر؟	☐ نوي	☐ د منلو وړ	☐ زاړه
ځرنګوالی؟	☐ ښه	☐ منځی	☐ خراب
باوري؟	☐ ډير	☐ ځه نا ځه	☐ يو نيم وار
لاس ته راتلونکی؟	☐ ډير	☐ ځه نا ځه	☐ يو نيم وار

Were the **equipment operators**:

☐ Local ☐ Afghan ☐ International

Skilled?:	☐ Very	☐ Average	☐ Poor
Reliable?:	☐ Very	☐ Somewhat	☐ Seldom
Available?:	☐ Very	☐ Somewhat	☐ Seldom

آيا د وسائيلو چلونکي:

☐ ځايی ؤ ☐ افغانان ؤ ☐ نړيوال ؤ

ماهر؟	☐ ډير	☐ منځی	☐ خراب
باوري؟	☐ ډير	☐ ځه نا ځه	☐ يو نيم وار
لاس ته راتلونکی؟	☐ ډير	☐ ځه نا ځه	☐ يو نيم وار

Please describe any important issues with equipment or operators that hindered project execution significantly: --------

مهرباني وکړی هر هغه مهم ټکي چې د وسائيلو او يا د وسائيلو د چلاونکو په هکله، د پروژې په سرته رسولو کي يې د پام وړ خنډون رامنځ ته کړی ؤ توضيحات ورکړی.

29. What aspects of the construction process worked particularly well? Describe.

د پروژې د آبادونی کوم اړخ په خاصه توګه ښه تر سره شو؟ توضيح يې کړی.

30. What aspects of the construction process worked particularly poorly? Describe.

د پروژې د آبادونی کوم اړخ په خاصه سم تر سره نشو؟ توضيح يې کړی.

31. What changes in the process might improve this result?

کومو بدلونونو د امکان په صورت کي په دی نتيجه کي سمون راوستلی شوای؟

Materials

مواد

32. Were the specified construction materials readily available in the local area? ☐ Yes ☐ No

د آبادونی تعيين شوی مواد په ځايی سيمه کي سمدلاسه د لاسته راوړو وړ ؤ؟

☐ هو ☐ نه

a) If you answered YES:

Was the quality: ☐ High ☐ Medium ☐ Low ?

Was the consistency: ☐ High ☐ Medium ☐ Low ?

الف ـ د "هو" ویلو په صورت کې:

د کیفیت څرنګوالی؟ ☐ لوړ ☐ منځنی ☐ ټیټ

ثابتوالی؟ ☐ لوړ ☐ منځنی ☐ ټیټ

b) If you answered NO:

Was a suitable local substitute found or seriously considered?

☐ Yes ☐ No

ب ـ د "نه" ویلو په صورت کې:

کومه وړ سیمه ئیز عوضی مواد پیدا او یا په جدي توګه په پام کې ونیول شول؟

☐ هو ☐ نه

Did/would the design need changes to meet the local substitute material properties?

☐ Yes ☐ No

آیا د وړ سیمه ئیزو عوضی موادو د کارولو په صورت کې، په ډیزاین کې کوم بدلون ته اړتیا ونشوه؟

What percentage of construction materials needed to be brought in from outside the area? _____%

په سلو کې څو برخې د آبادونې موادو ته اړتیا وه چې له بلې سیمې څخه د پروژې ساحې ته راوړل شي؟ .....٪

Roughly, how far did substitute materials from outside the area need to be transported?

☐ ~≤100km (or within the Province)

☐ ~≤500km (or within the country)

☐ ~≤1500km (or from neighboring countries)

☐ ~≥1500km (or from major industrialized countries)

په تخمیني ډول، له څومره لرې سیمې څخه وړ عوضی مواد ته اړتیا وه چې د پروژې ساحې ته راوړل شي؟

☐ ~≥ ۱۰۰ km (او یا په ولایت کې دننه)

☐ ~≥ ۵۰۰ km (او یا په هیواد کې دننه)

☐ ~≥ ۱۵۰۰ km (او یا له ګاونډی هیواد څخه)

☐ ~≤ ۱۵۰۰ km (او یا له پرمخ تللی صنعتی هیوادونو څخه)

33. Please describe material quality, consistency, availability, or substitution problems encountered: --------

مهرباني وکړی د موادو کیفیت، ثابتوالی، شتوالی، او یا د بدلولو په اړه چې کوم خنډونه موجود ؤ، تشریح کړی.

Quality Control and Quality Assurance (QC/QA)

دکیفیت ځارنه او د کیفیت ډاډینه (QC/QA)

34. The degree of QC/QA was:

☐ Thorough ☐ Moderate ☐ Minimal ☐ None

If NONE, please indicate why: --------

د QC/QA د بنه والی درجه:

☐ پوره ☐ معتدل یا برابر ☐ لږ ☐ هیڅ یو نه

که چیری نه، مهربانی وکړی وښایاست چې ولې: ----------

35. What tests were performed on construction materials? What test standards were followed? --------

کوم ازمایښتونه په آباداني موادو باندو باندی سرته رسیدلي ؤ؟ د ازمایښتونود کوم معیار پر بنسټ دا ازمایښتونه سرته رسیدلي؟

36. Meeting QC/QA standards was:

☐ Impossible ☐ Extremely difficult ☐ Challenging

☐ Average ☐ Easy ☐ Extremely easy

د QC/QA د معیارونو پر بنسټ د پروژې سرته رسیدل:

☐ ناښونی ☐ په بی ساری توګه سخت ☐ ګوابنونکی

☐ منځی ☐ هوسا ☐ په بی ساری توګه هوسا

Which standards were particularly difficult to follow?

کوم معیارونه په خاصه توګه سخت ؤ چې تعقیب شی؟

If you could do the project over, what would you change as far as standards or materials to avoid these issues?

که چیری تاسو دغه پروژه بیرته له سره وکاروی، په معیارونو او موادو کې د څه بدلون سلا کوی چې د پورتنی کړاؤنو مخنیوی وشی؟

Which standards were easy to follow?

کوم معیارونه هوسا ؤ چې تعقیب شی؟

37. Was modification or substitution of the specified tests necessary?

☐ Yes ☐ No

آیا د دغو مشخصو آزمایښتونو اصلاح یا بدلون ضروري ؤ؟

☐ هو ☐ نه

IF YES, what needed to be changed, why, and what modification or substitution was made?

که چیري نه، کومو څیزونو ته اړتیا وه چې تغیر شي، ولې، او کوم اصلاحات یا بدلونونه را منځ ته شول؟

38. Testing equipment and laboratories used were:

☐ Local ☐ Afghan ☐ International ?

Age?: ☐ Modern ☐ Acceptable ☐ Dated

Condition?: ☐ Good ☐ Average ☐ Poor

Reliable?: ☐ Very ☐ Somewhat ☐ Seldom

Available?: ☐ Very ☐ Somewhat ☐ Seldom

د آزمایښتونو کاریدلی وسائیل او لابراتوارونه:

☐ سیمئیز ؤ ☐ افغانی ؤ ☐ نړیوال ؤ

عمر؟ ☐ نوي ☐ د منلو وړ ☐ زاړه

څرنګوالی؟ ☐ ښه ☐ منځی ☐ خراب

باوري؟ ☐ دیر ☐ څه نا څه ☐ یو نیم وار

لاس ته راتلونکی؟ ☐ دیر ☐ څه نا څه ☐ یو نیم وار

Laboratory technicians were: ☐ Local ☐ Afghan ☐ International

What was their training level?: ☐ High ☐ Average ☐ Poor

Were they reliable?: ☐ Very ☐ Somewhat ☐ Seldom

Were they vailable?: ☐ Very ☐ Somewhat ☐ Seldom

د لابراتوارونو تخنیکګر:

☐ سیمئیز ؤ ☐ افغانی ؤ ☐ نړیوال ؤ

د هغوی د روزنې کچه: ☐ لوړه ☐ منځی ☐ کم زوري

آیا د باور وړ ؤ؟ ☐ ډیر ☐ څه نا څه ☐ یو نیم وار

آیا موجود ؤ؟ ☐ ډیر ☐ څه نا څه ☐ یو نیم وار

39. Were local test facilities, equipment, and technicians available?

☐ Yes ☐ No

If YES and they were not used, please explain why: --------

آیا د ازمایښتونو سیمئیزي اسانتیاوي، وسائیل، او تخنیکګر په لاس راتلونکی ؤ؟

☐ هو ☐ نه

که چیرې "ؤ" او هغوی په کار نه دی وړل شوي، توضیح ئی کړی چې ولي: .....

Other Project Considerations

40. Were delays encountered during the project? ☐ Yes ☐ No

The delays were caused by: --------

د پروژې نور د پام وړ ټکي

آیا په پروژه کي ځنډونونه مخ ته راغلل؟

☐ هو ☐ نه

دغه ځنډونونه د څ له کبله منځ ته شول؟ .....

41. Is there an established inspection process or procedure that was completed prior to transferring ownership of the completed project to the owner?

☐ Yes ☐ No

If you answered YES:

Describe the inspection procedure:

مخته له دی چې د پروژې واک د هغې خاوند وروسپارل شی، آیا کومه منل شوي د کتنې کړنلاره بشپړه شوي وه ؟

☐ هو ☐ نه

که ستاسو ځواب "هو" وي، د دغې کتنې کړنلاره توضیح کړی؟

42. Were there any change orders in the project?

په پروژه کي کومې چارې زیاتي یا کمي شوي؟

If YES, what was the reason(s) for the change order(s)?

که "هو"، د څه له وجې دغه چارې زیاتي یا کمي شوي؟

Education and Training, Maintenance and Operations

زده کړه او روزنه، ځارنه او په کار اچونه/کار اخیستنه

43. Who is currently responsible for operating the finished project? _____

د بشپړې شوې پروژې د کاراچوني/کاراخیستنې مسئول اوس څوک دی؟

44. Who currently maintains the finished project? _____

څوک اوس دغه بشپړه شوې پروژې ځاري؟

45. Were members of the local Afghan community trained to operate and/or maintain this facility? ☐ Yes ☐ No

آیا د سیمئیزي افغانی ټولنې غړی روزل شوی ؤ چې د دغې ودانۍ په کاراچونه او/یا ځارنه وکړی؟

☐ هو ☐ نه

If YES, how was the training conducted? Did it follow a standard procedure or curriculum? Describe.

که "هو"، څرنګه دا روزنه تر سره شوه؟ آیا دغې روزنې کومه معیاري کړنلاره یا تعلیمي نصاب تعقیباوه؟ توضیح ېې کړی.

46. In which areas were training provided?

☐ Operations ☐ Maintenance ☐ Management and monitoring

☐ Record keeping ☐ Other. Please specify --------

په کومو ساحو کې روزنه برابره شوی وه؟

☐ په کار اچونه ☐ څارنه ☐ مدیریت او کنټرول

☐ سوانح سائل ☐ نور، ویناموی .....

47. Were provisions made to train new personnel on a continuing basis?

☐ Yes ☐ No

آیا تیاری نیول شوې ؤ تر څو نوي کارکونکی داوامداره ټوګه وروزی؟

☐ هو ☐ نه

48. Which training formats were used? (Check all that apply)

☐ Classroom ☐ Web-based learning ☐ Handouts

☐ On-the-job ☐ Other. Please specify --------

روزنه په کومه بڼه تر سره شوه؟ (هغه ټول په نشه کړی چې د پلې کیدو وړ دي)

☐ په ټولګی کې؟ ☐ د انټرنټ په مرسته ☐ د کاغذ په توټوکي

☐ په دنده کې ☐ نور. ویناموی .....

49. Which training formats were most successful? (Rank, with 1 as most effective and 5 as least effective.)

☐ Classroom ☐ Web-based learning ☐ Handouts

☐ On-the-job ☐ Other. Please specify --------

د روزنې کومه بڼه تر ټولو بریالی وه؟ (د اغیزناکوالی پر بنسټ ېې درجه بندی کړی، "۱" تر ټولو اغیزناکه او "۵" تر ټولولږ اغیزناکه.

☐ په ټولګی کې؟ ☐ د انټرنټ په مرسته ☐ د کاغذ په توټوکي

☐ په دنده کې ☐ نور. ویناموی .....

50. What language was training conducted in?

☐ Dari ☐ Pastho ☐ English ☐ Other (specify)

په کومه ژبه روزنه تر سره شوه؟

☐ دری ☐ پښتو ☐ انګریزی ☐ بله ژبه (ویناموی) .....

51. Was training locals/owner part of the contract? ☐ Yes ☐ No.

آیا روزنه د سیمئیزو وګړو/خاوند د ټرون برخه وه؟

52. How were trainees evaluated?

څرنګه روزونکي وازموئیل شول؟

53. Based on your experiences, what methods or techniques are either in use, or should be adopted to improve the ability of people from culturally diverse backgrounds to interface to perform these projects, given frequent personnel turnover?

د تاسو د تجربې پر اساس، کوم میتودونه او تخنیکونه اوس کاریګی او یا باید وکارول شی تر څو د هغو وګړو قابلیتونو ته چې له بیلابیلو سابقوسره دی وده ورکړی او دا پروژی سرته ورسوی، فرض کړی چې نوی کارکونکی راځی او پخوانی کار خوشی کوی او یا لا هم وی.

Questions for Customer/ end-user perspective on Lessons Learned for engineering and construction:

1) Please provide background of your mission and responsibilities.

2) How is the requirements established?

3) From the end-user standpoint, does the user provide input to the requirements and processes in terms of programs as it relates engineering and construction?

4) Looking at the various aspects (strategic development, execution, implementation and user-transition), what works well in this process?

5) What doesn't work well and what are the challenges?

6) Is there a lesson learned process from the end-user as it relates to engineering issues?
   a. If they are compiled, are you involved in it?
   b. How is the lessons learned used in the decision process?
   c. How does this information influence in your decision making?
   d. Where does the lesson learned data reside and who has access/management of it?

7) If not, why don't you have a lesson learned process, database, etc.

8) What other framework do you like to see?

9) Based on your experience, what are some positive things that you would like to share?

10) What are major challenges you would like to share that impacts the end-users?

11) In your opinion, what are the positive and negative things that the USACE (as executors) are doing to meet the requirements, and what do they need to prove on?

12) Other issues…

Appendix B: Data—Summarized Phases

P-Problem S-Solution	Summarized Phrase	LN Count	Count
	Resources		
P	Dysfunctional relationship or limited communication between customer and users		1
P	Underutilized staff		1
P	Poor master plan		1
S	Provide single point funding with some flexibility and be able to direct to organizations that can execute quickly and precisely (U.S. Air Force, USACE, Navy, or friendly nations that assist in planning, design, construction & contract oversight)		1
S	Providing architects work for CSTC-A to define vertical construction projects by meeting with Military (ANA), MOI, ANP, and U.S. forces to program facilities		1
S	Integration of 3 ANA LTs in Kabul with USACE AED-N		1
S	Monthly local chats		1
S	Designate a specific U.S. mentor to help Afghan Army or Police to get involved in planning and decisions as the customer		1
S	Get feedback from the mentors who interact with the end users (Afghans) and get input from the users		1
	Contracts		
P	Not rating and recording contractors' performance		1
P	Past performance is sometimes difficult for new companies to develop even if they have qualified staff and equipment	1	1
P	Delays due to lack of attention to the BCOE process and other tracking mechanisms, including modifications		1
P	Better way of analyzing reasonable performance periods to get duration into contracts	2	3
P	Proper scheduling is a major problem for local firms		1
P	American firms are typically over committed		2
P	Switch of customers (from U.S. Military to Afghan Army)		1
P	Contractors' labor pool quality, consistency, portability (conflicts with other villages)		1
P	Design-build projects are not suitable for small, similar site condition projects		1
P	Regulations and rules to award contracts vary by donor, leading to low quality, high cost projects	2	2
P	Large projects difficult for small companies to handle	2	2
P	Small LN contractors lack resources and relationships to compete against large companies for contracts	2	2
P	Prime contractors subcontract all work	1	2
P	Design-build contracts are not appropriate for small Afghan firms with no design capabilities		2
P	Methods for handling security costs in contracts		2
P	Local contractors work ethic are different (i.e. U.S. more stringent)		2

P-Problem S-Solution	Summarized Phrase	LN Count	Count
P	Customer drives unrealistic contract duration		2
P	No proactive mechanisms between prime contractors and subcontractors		2
P	Multiple site contracts for Afghan firms are not appropriate		3
P	Start-up firms require hand-holding/assistance		3
P	Acquisition process is not flexible for contingency operations		3
P	Difficult to verify contractor qualifications		3
P	USACE personnel have short deployments & inappropriate background		9
P	Project management decisions are made without in-country engineering feedback		4
P	Contracting process for O&M is conducted by donors without local government involvement	1	1
P	Short timeline to develop a cohesive well-defined project scope for RFP		1
P	Funding delays during execution		1
P	Not considering the end-user operability for BCOE process		1
S	More involvement of government ministries, such as MoPW, in overseeing the bidding process and construction work	2	2
S	Quality and Cost Base Selection (QCBS) method works well	1	1
S	Design review team membership should remain consistent throughout process	1	1
S	Improve process for design review and inspection	1	1
S	Use firm fixed price in contracts		1
S	Give Afghans credit for joint ventures with international firms		1
S	Small business administration for local firms		1
S	Hire local nationals to support USACE contracting office to promote continuity and capacity development		1
S	Increased Coalition military contributions to security		2
S	Maintain a contractor list or database of qualified personnel		1
S	Formalize different expectations for large & small projects in contracts		1
S	Select contractors with stable financial capacity	2	2
S	Select contractors with qualified staff and past experience	2	2
S	Rate and record performance of contractors for future award decisions	1	2
S	Realistic anticipation of delays included in contracts (weather, security, local holidays, etc.)		2
S	Cross-over and overlap of personnel & record keeping		2
S	Teaching, coaching and mentoring of Afghans (i.e. contract management for engineers, ethics)		2
S	A tiered-level contract system based on size and experience to provide small companies opportunities to participate and grow	2	2
S	Give local contractors projects they can handle as much as possible to generate jobs, experience, and capacity development	2	3
S	Design-site-adapt contracts worked better		3
S	One contract per project (several small contracts instead of large combined contract)		3

P-Problem S-Solution	Summarized Phrase	LN Count	Count
S	Contractors with local village connections reduce security issues and have local buy-in		3
S	Simplify contract acquisition process		3
S	USACE should deploy only a very few critical positions. PMs, lawyers, and cost engineers can be located back in the U.S. Implement flex time and extended hours to accommodate time differences .		1
S	USACE can supply in-country engineering input to PM early in the decision process and for site selection		1
S	Maximize USACE Reachback Operations Center use for contingency support		1
S	Suggested ways to cope with human error and discontinuity		1
S	Emphasize the BCOE by providing the field adequate time to conduct the BCOE process properly and interface with the end user to address the operability		1
S	Increase construction guarantee from 1 to 2 years	1	1
S	Identify a specific group to do O&M before a project is considered		3
S	Contract should include spare parts, expendables (lubricants, filters, fuses, etc.), and training for several individuals at the facility location		1
	Site Assessment and Planning		
P	Including geotechnical information during the design phase		2
P	No load criteria and data		1
P	Difficult to determine availability of skilled labor	1	1
P	Weather and climate not incorporated in the planning process	1	1
P	Lack of hydrology data	2	2
P	Acquisition of real estate and right of way	2	3
P	Location not well defined prior to contract award, for example, proposed site overlap with existing infrastructure	1	2
P	Limited site assessment for the exact location	2	2
P	Poor data management leads to loss of critical information and hurts continuity		4
P	Security hinders access to sites	1	4
P	Demining issues in evaluating and planning sites (i.e. UXO removal)		4
P	Ignoring local suggestions and insights about conditions	1	1
P	Not using available geologic data	1	1
P	Are we building in the right spots; for the right people?		1
P	Record keeping is poor so existing conditions and as-built drawings are missing		1
S	Separate contracts are needed for site assessment		1
S	Evaluate the proposed site for suitability		1
S	Use of aerial photos & coordinates		1
S	Design site-adapt is more effective in Afghanistan than pure design-build		1
S	Consider use of geophysical methods to effectively locate underground water sources		1
S	CQM tools (developed by USACE for contractors) is a great system for site assessment	1	1

P-Problem S-Solution	Summarized Phrase	LN Count	Count
S	Establish good contacts with the local population, which will help solve security issues early in the project	1	1
S	Require MoPW to have as-built drawings for future development and maintenance of the road	1	1
S	Good management and planning, having a strong team with assigned roles and responsibilities	2	2
S	Maintain support and coordination with landowners/local proponents (buy-in)	2	5
S	Defensible high ground facilities need deeper wells		1
	Design and Construction		
P	Terrain challenges – mountainous; talus and alluvial fans (geology)		1
P	Existing conditions and as-built drawings are missing		1
P	Effective use of local labor		1
P	Blasting for clearing mountainous areas is difficult because of hard to get blasting materials	1	1
P	Current standards are not practical and difficult to implement in country (ASTM, AASTHO)	1	3
P	Disputes and confusion over use of multiple overlapping standards; some standards impractical for contingency operations		2
P	Poor workmanship affecting O&M	1	3
P	Local Government conflicts of expectation with National Government.		3
P	Afghans unfamiliar with international construction design and techniques		5
P	Local territorial labor issues (one is not welcome to work in another village)		4
P	Poor quality materials		5
P	Problems finding materials and long lead times to procure		5
P	Drainage and erosion	1	6
P	Westernized requirements and hardware not applicable in some cases		10
P	Issues with not accounting for climatic (weather) conditions	9	12
P	Security problems during construction (i.e. stealing materials), delays due to security and attacks	4	14
P	References and materials for requirements and standards are difficult to find in contingency operations		1
P	Site-adapt and austere designs are not well thought out		3
P	Drainage ditches are a safety hazard in compounds, especially at night		1
P	Ministry of Public Works has no authority to control the quality of work	1	1
S	Develop a list of locals' capabilities and constraints (can/cannot do)		2
S	Arrange for greater involvement of government ministries, such as MoPW, in overseeing the bidding process and construction work	1	1
S	Closely monitor contractor's performance		1
S	Flexible planning and scenarios		1
S	Support of landowners		1
S	Pre-mix sand and cement for mortar at batch plant to prevent stealing materials and maintain construction quality onsite		1

P-Problem S-Solution	Summarized Phrase	LN Count	Count
S	Use local materials of acceptable quality		1
S	Work closely with local designers and contractors		1
S	Develop more practical standards	1	1
S	Pre-cast concrete is a good option; stockpile materials	1	2
S	Site-adapt and austere designs work well		5
S	Use tough, simple, regionally replaceable mechanisms and hardware		6
S	Anticipate the climatic and weather effects in design & construction		8
S	Mentor contractors, designers and local workers		13
S	Better implementation of existing standards, including MoPW standards	1	1
S	Adjust the site-adapt design regionally, modify codes for contingency operations and austere environments		8
S	Get feedback from the mentors who interact with the end users (Afghans) and get input from the users		1
S	Designer awareness of culture		1
	Materials		
P	Material theft		1
P	Poor processing of submittals for approval of materials	1	1
P	Issues with native materials, like silty soils		2
P	Local availability of materials, including asphalt		2
P	Electrical and mechanical supplies not available or lack safety rating (UL or CE)		2
P	Non-standard foreign materials		3
P	Sourcing material can take a long time (6 months or more)	1	4
P	Standards and criteria are lacking for foreign materials	4	4
P	Material quality varies dramatically	2	7
P	High quality materials require importing	1	4
P	AISA office lacks technical staff and equipment to check imported material quality	1	1
P	Material supply chain tracking is difficult, such as identifying CMU from an approved batch plant versus inferior		1
P	Logistical issues in providing necessary materials and supplies due to limited industrial capability.		1
S	Adjust material requirements		1
S	Closely monitor material quality and work proactively with the manufacturers and suppliers		1
S	CMU is a good option for austere construction of buildings		2
S	Concrete and brick masonry work well	1	2
S	Submittal review process for list of material should be shortened	2	2
S	Portable machine for making quality CMU on site (solve logistics, tracking, quality, etc)		1
	Quality Control and Quality Assurance		
P	Calibration of testing equipment		

P-Problem S-Solution	Summarized Phrase	LN Count	Count
P	Concrete segregation/voids hard to catch.		1
P	QC report not realistic in some cases.		1
P	Unsupervised work by contractor affecting QC. Producing substandard structure then covering it over.		1
P	Not following design requirements for financial gain		1
P	Not conducting tests because the contractor runs short on money		1
P	Contractor tells you what you want to hear.		1
P	Use of non-U.S. materials without modified guidance/standards affects quality and should require additional testing.		1
P	Quality suffers to meet schedule deadline		1
P	Security and logistics to access work sites for QC/QA	1	1
P	Inspection period made available by contractors for QA before construction proceeds has not been adequate.	2	3
P	Contractor Quality and Management (CQM) paperwork is difficult to follow which impacts material selection and design		2
P	Basic QA knowledge of USACE personnel in area of responsibility limited by their unrelated background.	2	2
P	Poor design and QA affect O&M		3
S	Frequent calibration of density gages	1	1
S	In recent years, concrete batch plants have been established, producing good quality concrete		1
S	Verification of QA/QC results to control falsifications		1
S	Involve military personnel in construction projects for rough assessments in dangerous areas		1
S	Training/shadowing by military personnel to gain basic QA/QC familiarity		1
S	To get good information QA personnel need to be crafty in asking the contractors questions		1
S	International experts working in partnership with locals on site to learn and improve construction quality worked well		1
S	Protect local national inspectors from harassment and intimidation by claiming that you found the flaws without revealing info actually came to you from LN. For example say “Last time I was here, I noticed…”.	1	2
S	Following standards requires paying attention and applying personal insight		1
S	Hiring Afghans or locals for QC/QA		1
S	Afghan test facilities and testing capabilities have improved		3
S	Laboratory facilities are reliable in some locations		3
S	USACE has provided Afghans with good training		3
S	USACE inspection and approval of Afghan laboratories and test equipment has been a great success		3
S	Timely or daily site inspections		3
	Cultural		
P	Not accounting for local holidays	1	1
P	Conflict of expectations between central government and villages in their desire for westernized infrastructure		1

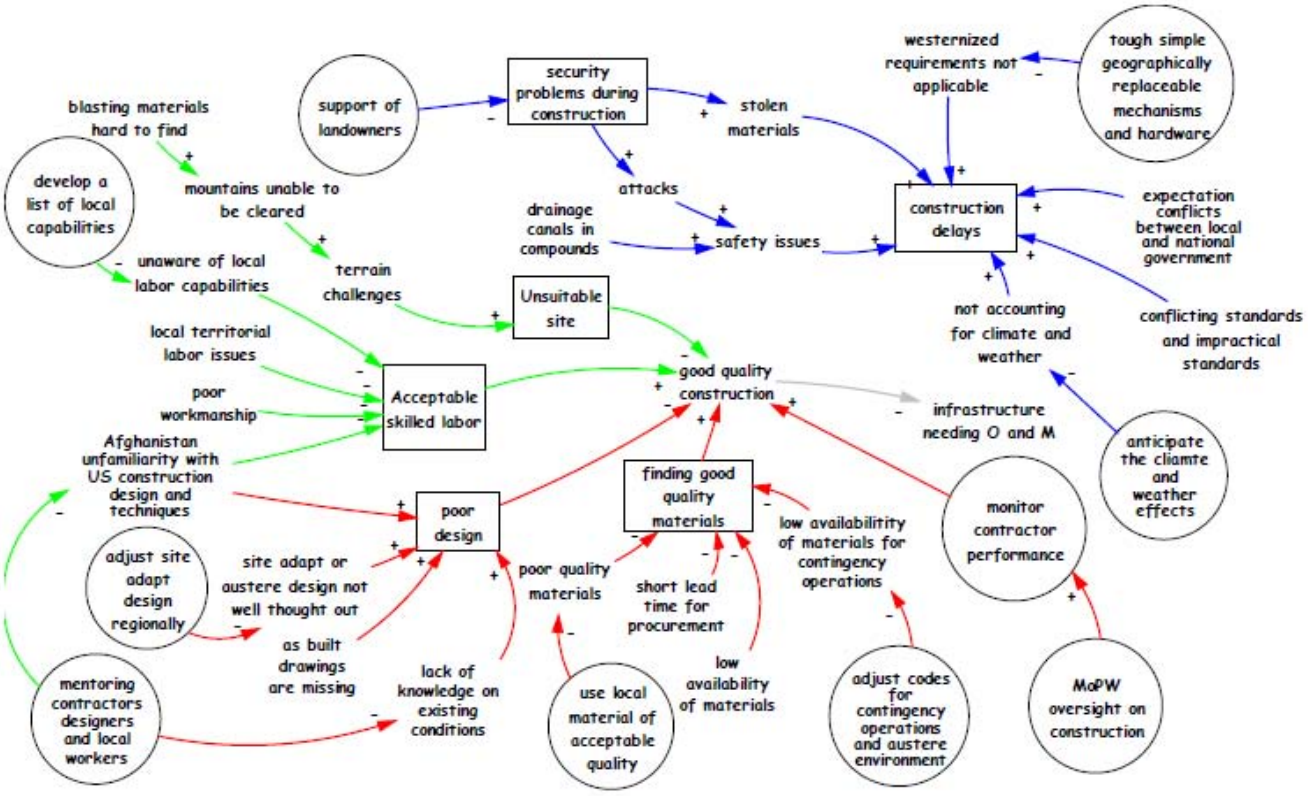
P-Problem S-Solution	Summarized Phrase	LN Count	Count
P	Effects of economic history		1
P	Over committing because of eagerness (outside the norm)		1
P	Assigned project may be seen as a "favor" in the Afghan cultural view		1
P	Tending to promise what can't be delivered. Begging and pleading as a cultural norm.		1
P	Lack of written schedules		1
P	Language barrier in some instances		2
P	Threats and intimidation for helping coalition		1
P	Inter-village relations/conflict (local elder concept, warlords), territorial issues		2
P	Not accustomed to rushing.		3
P	Civil/criminal rule of law (including theft)		3
P	Tell you what you want to hear and understand, but they don't.		3
P	Corruption and bribery		6
P	Accustomed to non-western facilities and solutions		7
P	Job site safety	4	9
S	Afghans embrace educational opportunities		1
S	Safety training for Afghans	1	1
S	Training in local languages		1
S	Use Afghan translators with engineering background		2
S	Routine contact with local leaders to maintain/continue project support and address concerns	1	2
S	Build simpler facilities more appropriate for austere environment		6
S	Provide projects that engage cultural architecture and needs		2
S	Recognize the local national facial expressions and body language		1
S	Cultural knowledge of designer		1
S	Activities directly benefit local people by creating jobs during construction	2	2
S	Purchase materials and services from local businesses to develop domestic economy	2	4
	Education		
P	Difficult for over-tasked USACE personnel to train and mentor local nationals		2
P	High USACE personnel turn-over and R&R affects continuity of LN training		1
P	Literacy		1
P	Lack of communication and setting expectations for local nationals		1
P	Success is measured by physical improvements but not mentoring and education		1
P	Issues with relationships and respect between contractor and workers		1
P	Journeymen skills were not initially available among Afghans	1	2
P	Lack of construction planning, scheduling and management skills of local nationals		3
P	Lack education on contracts, business process, ethics, decision making, and planning		1

P-Problem S-Solution	Summarized Phrase	LN Count	Count
P	Further assistance is needed so that Afghans can take the lead for growth and improvements of infrastructure and self-sufficiency		1
P	Local nationals are not trained for operation and maintenance (O&M)	1	2
P	O&M training is not designed to develop LN teachers that can pass along training to new students without coalition support		3
P	Local end users not prepared to maintain and repair the new infrastructure, given currently limited capabilities and resources	1	7
S	Develop classroom materials	1	1
S	Develop suitable training facilities for qualified professional trainers to teach the target audience	1	1
S	Orientation for workers before construction starts to discuss project goals, government regulations, safety, technical information, punctuality, honesty, etc.	1	1
S	Hiring specific tasker for mentoring and training.		2
S	Provide on-the-job or hands-on training at facility delivery time or during hand-off		1
S	Provide operation and maintenance guide and manuals for facility		1
S	Training video for O&M using local national languages		1
S	Active participation and interaction with trainees and workers		1
S	Stress quality workmanship is better than quantity	1	1
S	Training and education of community to help with security	2	2
S	Train the local laborers and masons for different activities	2	2
S	Make short term courses in some new topics for Afghan engineers	1	1
S	Train Afghan companies in design	1	1
S	Train Afghan companies in RMS and QCS software	1	1
S	Train Afghan companies how to create and implement quality control plans and specifications	2	2
S	Be aware that Afghans may lack technical knowledge		1
S	Develop trade schools and specialized training (geotech, surveying, etc.)		3
S	Hiring and training locals for QA and other engineering related tasks	1	3
S	Run workshops on construction methods and project management during the off-season, including local and international construction methods	1	2
S	Teaching, coaching, and mentoring has to be part of everyone's job	1	2
S	Require on-the-job training	1	7
S	Train the local Afghan staff (MoPW employees) in design, surveying, construction, and maintenance	1	1
S	Train equipment operators for safety	1	1
S	Develop LN teachers specifically for O&M training		2
S	Greater focus on mentoring and training to develop self-sufficiency		7

Appendix C: Causal Maps

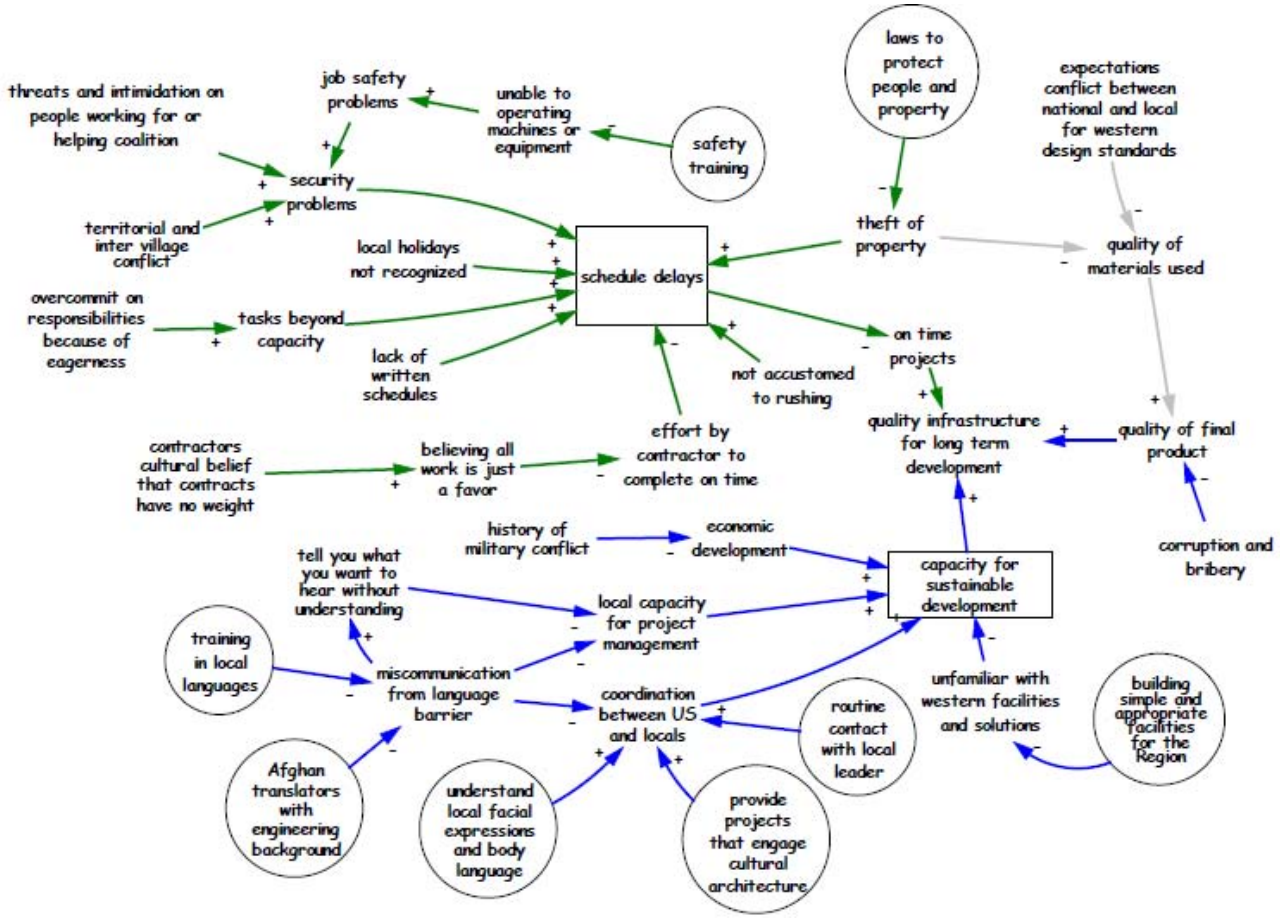
Overview/Problem Solution Data

Design and construction



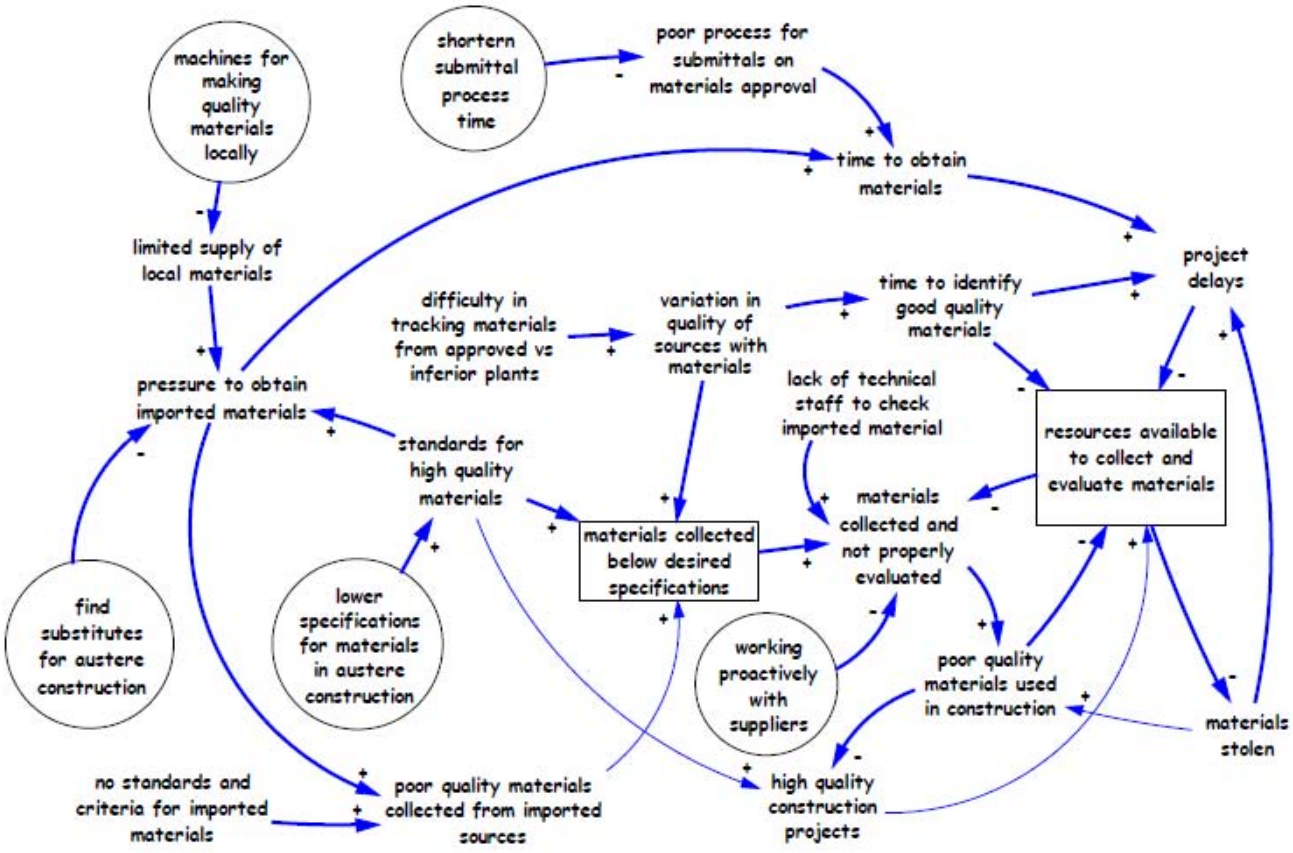
P-S	Total Count	Design and Construction: Problems & Solutions
P	14	Security problems during construction (i.e. stealing materials), delays due to security and attacks
P	12	Issues with not accounting climatic (weather) conditions:
P	10	Westernized requirements not applicable in some cases
P	6	Drainage & Erosion – water ponding
P	5	Unfamiliarity of construction design and construction techniques (Afghanistan)
P	5	Problems finding materials and lead time to plan in advance in procuring materials.
P	5	Poor quality materials
P	4	Local territorial labor issues (one is not welcome to work in another village)
P	3	Local Government conflicts of expectation with National Government.
P	3	Site-adapt or austere design is not well thought out
P	3	Poor workmanship - affecting O&M
P	3	Current standards are not practical and difficult to implement in country (ASTM, AASTHO)
P	2	Several standards and specs to use for a particular problem to solve a dispute, it is difficult to judge what standard is being used; some standards are impractical to use for contingency operations
P	1	Terrain challenges – Mountainous, Talus & alluvial fans (geology)
P	1	Blasting for clearing mountainous areas is difficult because of hard to get blasting materials
P	1	How to use local labor effectively?
P	1	Existing conditions and as-built drawings are missing
P	1	References and materials for requirements and standards are difficult to find in contingency operations
P	1	Drainage canals are safety hazard in compounds especially at night
S	13	Mentor contractors, designers and local workers
S	8	Adjust the site-adapt design regionally, modify codes for contingency operations and austere environment
S	8	Anticipate the climatic and weather effects in design & construction
S	6	Tough, simple, geographically replaceable mechanisms and hardware
S	5	Site-adapt / Austere design works well
S	2	Pre-cast concrete is also best option stock pile materials
S	2	Develop a list of local capabilities and constraints (can/cannot do)
S	1	Get feedback from the mentors who interact with the end users (Afghans) and to get input from the users
S	1	Implement existing standands better including MoPW standards
S	1	Working closely with local design and contractors
S	1	Use local material of acceptable quality
S	1	Pre-mix sand, cement for mortar in batch plant to prevent stealing materials and maintain construction quality
S	1	Support of landowners
S	1	Flexible planning and scenario
S	1	Closely monitoring contractor's performance
S	1	Arrangement for more involvement of government ministries, such as MoPW, in overseeing the bidding process and construction work.
S	1	Designer knowledge of culture
S	1	Develop more practical standard

Cultural Issues



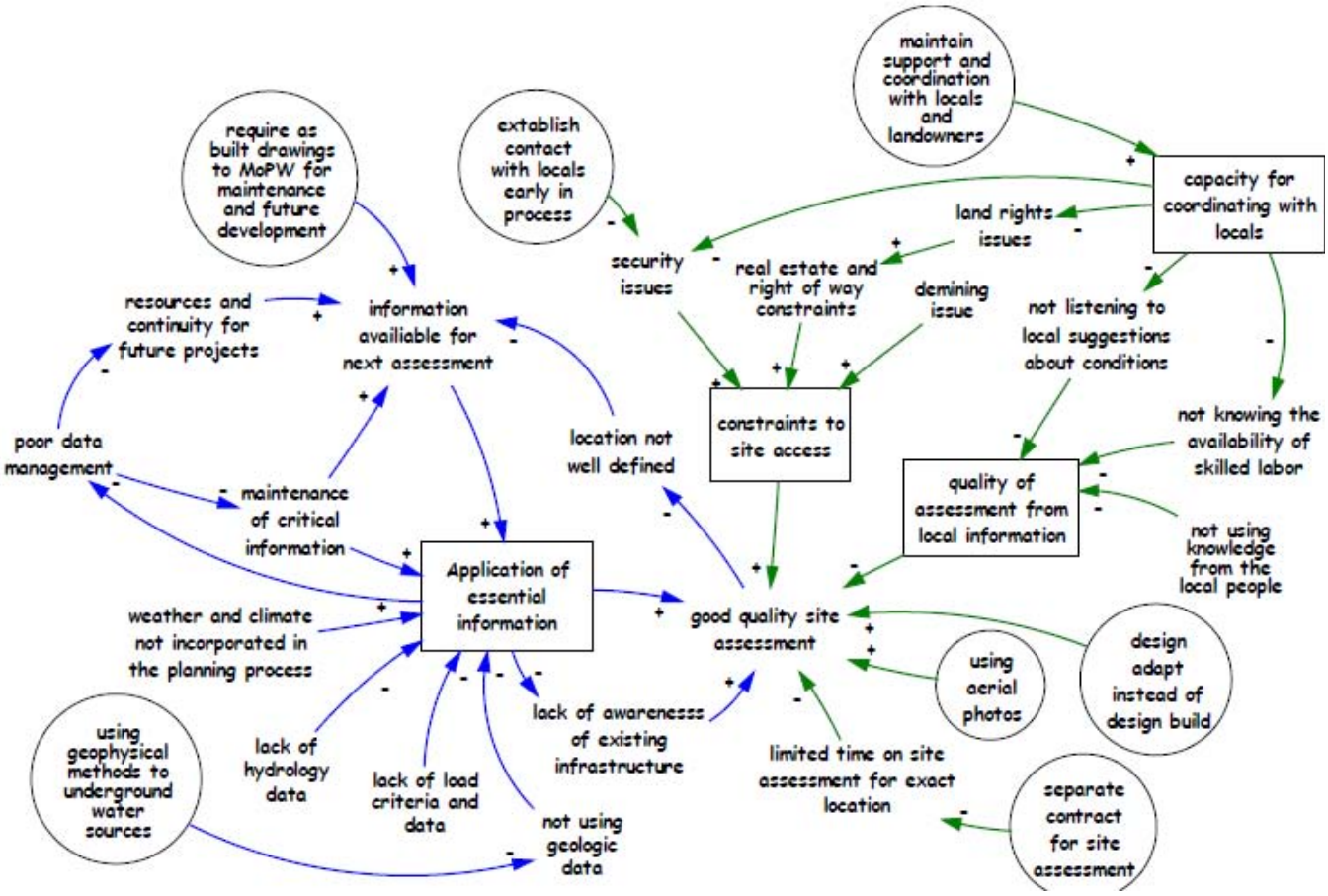
P-S	Total Count	Cultural: Problems & Solutions
P	9	Job site safety
P	7	Accustomed non-western facilities and solutions
P	6	Corruption and bribery
P	3	Not accustomed to rushing.
P	3	Tell you what you want to hear and understand, but they don't.
P	3	Civil/criminal rule of law (including theft)
P	2	Inter-village conflict/relations (local elder concept, war load), territorial
P	2	Language barrier in some instances
P	1	Conflict of expectations between central government and villages in their desire for westernize infrastructure
P	1	Effects of economic history
P	1	Over committing because of eagerness (outside the norm)
P	1	Their system that this project is assigned to them as a 'favor' - "Favor" concept.
P	1	Begging and pleading -tend to promise then could not deliver; they like to beg and plead, as a part of the culture
P	1	Lack of written schedules
P	1	Threats and intimidation for helping coalition
P	1	Not counting for official holidays
S	6	Build simpler and appropriate facilities (austere)
S	2	Use Afghan translators with engineering background
S	2	Provide projects that engage cultural architecture
S	2	Routine contact with local leaders to maintain/continue project support and address concerns
S	1	Designer knowledge of culture
S	1	Giving opportunity education is embraced.
S	1	Safety training
S	1	Training in local languages
S	1	Recognize the local national facial expressions and body language

Materials


machines for making quality materials locally
shortern submittal process time
poor process for submittals on materials approval
time to obtain materials
project delays
limited supply of local materials
difficulty in tracking materials from approved vs inferior plants
variation in quality of sources with materials
time to identify good quality materials
pressure to obtain imported materials
lack of technical staff to check imported material
resources available to collect and evaluate materials
standards for high quality materials
materials collected and not properly evaluated
materials collected below desired specifications
find substitutes for austere construction
lower specifications for materials in austere construction
working proactively with suppliers
poor quality materials used in construction
materials stolen
no standards and criteria for imported materials
poor quality materials collected from imported sources
high quality construction projects

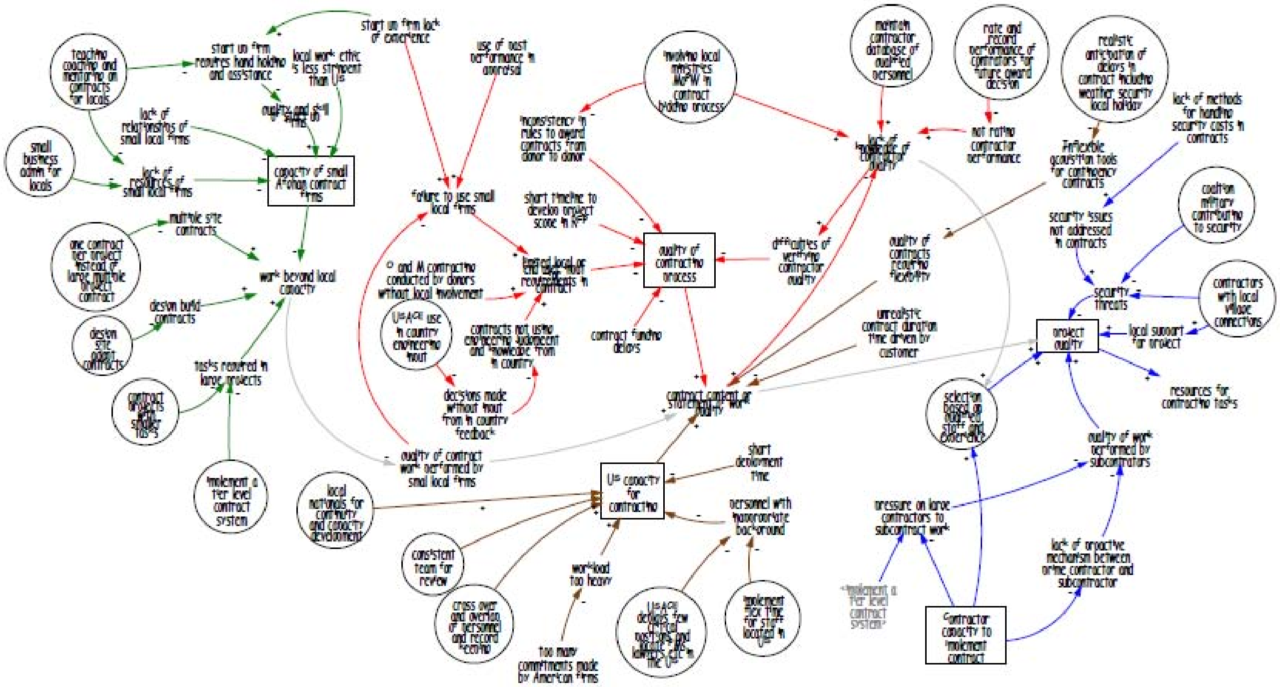
P-S	Total Count	Materials: Problems & Solutions
P	7	Quality varies dramatically
P	4	Sourcing material can take a long time (6 months or more)
P	4	Higher quality materials need to be imported
P	4	No standards and criteria for imported materials
P	3	Variation of different type of (foreign) material available
P	2	Electrical/Mechanical not available and if available they lack UL or CE rating
P	2	Materials not locally available including asphalt
P	2	Native material issues
P	1	Tacking of materials is difficult to indentify, such as CMU from approved batch plant versus inferior
P	1	AISA Office, lack technical staff and equipment to check imported material quality
P	1	Material theft
P	1	Poor processing of submittals for approval of materials
S	2	CMU is a good option for austere construction of buildings
S	2	Concrete and brick masonry work well
S	2	Submittal process for review for list of material should be shorten
S	1	Closely monitor quality of material and work proactively with the manufacturers/suppliers
S	1	Adjust requirements of materials
S	1	Portable machine for making quality CMU on site (solve logistics, tracking, quality, etc)

Site Assessment



P-S	Total Count	Site Assessment: Problems & Solutions
P	4	Poor data management leads to loss of critical info and continuity:
P	4	Security hinders access
P	4	Demining Issue (i.e. UXO removal)
P	3	Acquire Real Estate and right of way
P	2	No hydrology data
P	2	Location not well defined prior to contract award, for example, proposed site overlap with existing infrastructure
P	2	Limited site assessment for the exact location
P	2	Design - Phase, including geotechnical information
P	1	Are we building in the right spots; for the right people?
P	1	No load criteria & data
P	1	Not knowing the availability of skilled labor
P	1	Weather and climate not incorporated in the planning process
P	1	Not using the geologic data
P	1	Do not listen to local suggestion and insights about conditions
S	5	Maintain support and coordination with landowners/local proponents buy-in.
S	2	Good management and planning, having a strong team and assigned roles and responsibilities
S	1	Defensible high ground facility need deeper wells
S	1	Separate contracts are needed for site assessment
S	1	Evaluate the proposed site for suitability
S	1	Use Aerial photos & coordinates
S	1	Design site – adapt is more effective (Afghanistan) than pure design-build
S	1	Consider use of geophysical methods to effectively locate underground water sources
S	1	CQM tools (developed by USACE for contractors) was/is perfect system for site assessment
S	1	Better contact established with the local population, which will help solve security issues early in the project
S	1	MoPW required to have as-built drawings for future development and maintenance of the road

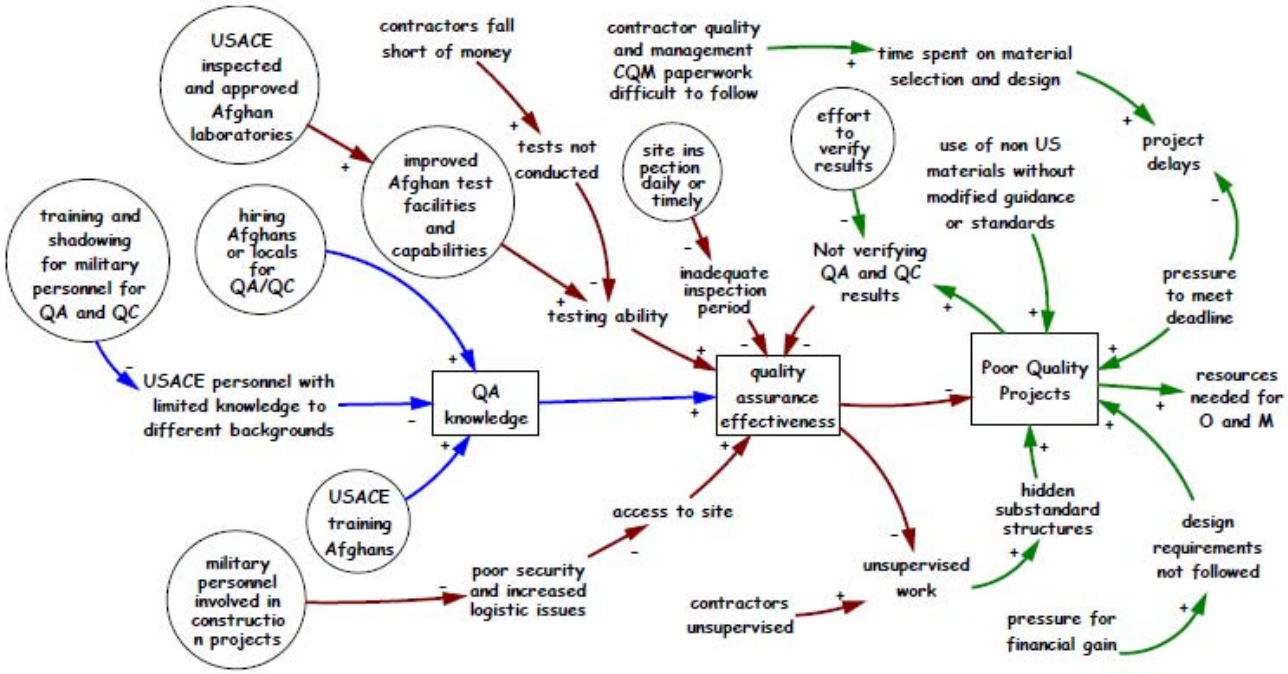
Contracts


small business admin for locals
capacity of small Afghan contract firms
multiple site contracts
work beyond local capacity
design build contracts
design site adapt contracts
tasks required in large projects
implement a tier level contract system
start up firm lack of experience
use of past performance in appraisal
failure to use small local firms
short timeline to develop project scope in RFP
quality of contracting process
contract funding delays
quality of contract work performed by small local firms
local nationals for continuity and capacity development
consistent team for review
workload too heavy
too many commitments made by American firms
short deployment time
personnel with inappropriate background
maintain contractor database of qualified personnel
rate and record performance of contractors for future award decision
not rating contractor performance
difficulties of verifying contractor quality
quality of contracts requiring flexibility
unrealistic contract duration time driven by customer
lack of methods for handling security costs in contracts
security issues not addressed in contracts
coalition military contributing to security
security threats
contractors with local village connections
project quality
local support for project
resources for contracting tasks
quality of work performed by subcontractors
pressure on large contractors to subcontract work
lack of proactive mechanism between prime contractor and subcontractor
Contractor capacity to implement contract

P-S	Total Count	Contracts: Problems & Solutions
P	9	USACE short deployment in personnel & inappropriate background
P	4	PM decisions are made without in-country or boots-on-the-ground engineering feedback
P	3	Better way of analyzing reasonable performance periods to get duration into contracts
P	3	Difficulties of verifying the contractors:
P	3	Acquisition tools not flexible for contingency contracting
P	3	Start-up firm requires hand-holding/assistance
P	3	Multiple site contracts for Afghan firms not appropriate
P	2	Design-build contracts are not appropriate for small Afghan firms with no design capabilities
P	2	No proactive mechanism between prime contractors and subcontractors
P	2	Customer drive unrealistic contract duration (time)
P	2	Methods for handling Security costs in contracts
P	2	Large contractors sub out all work
P	2	American firms are typically over committed
P	2	Big projects is difficult for small company
P	2	Different regulations or rules to award contracts from donor to donor leads to low quality, high cost projects
P	2	Small LN contractors lack resources and relationship to compete against large companies with more resources to win contract
P	2	Local contractors work ethic are different (i.e. US more stringent)
P	1	Not rating contractors performance & recording
P	1	Timeline is short to develop a cohesive well-defined project scope for RFP
P	1	Contracting process for O&M is conducted by donors without local government involvement
P	1	Past performance is sometimes difficult for new companies even if they have qualified staff and equipment
P	1	Delays due and lack of attention to the BCOE process and other tracking mechanisms, including modifications
P	1	Switch of customers (from US Military to Afghan Army)
P	1	Contractors labor pool quality, consistency, portability (conflict with other villages)
P	1	Design-build projects are not suitable for small similar site condition projects
P	1	Funds takes time come in for use during the time of execution
P	1	Not considering the end-user operability for BCOE process
P	1	Proper scheduling is a major problem for local firm
S	3	Simplify contract acquisition process
S	3	Contractors with local village connections reduce security issues and have local buy-in
S	3	One contract per project (small contract instead of large contract)
S	3	Design-site-adapt contracts worked better
S	3	Give local contractors projects they can handle as much as possible to promote
S	2	Rate (score) and record performance of contractors for future award decision

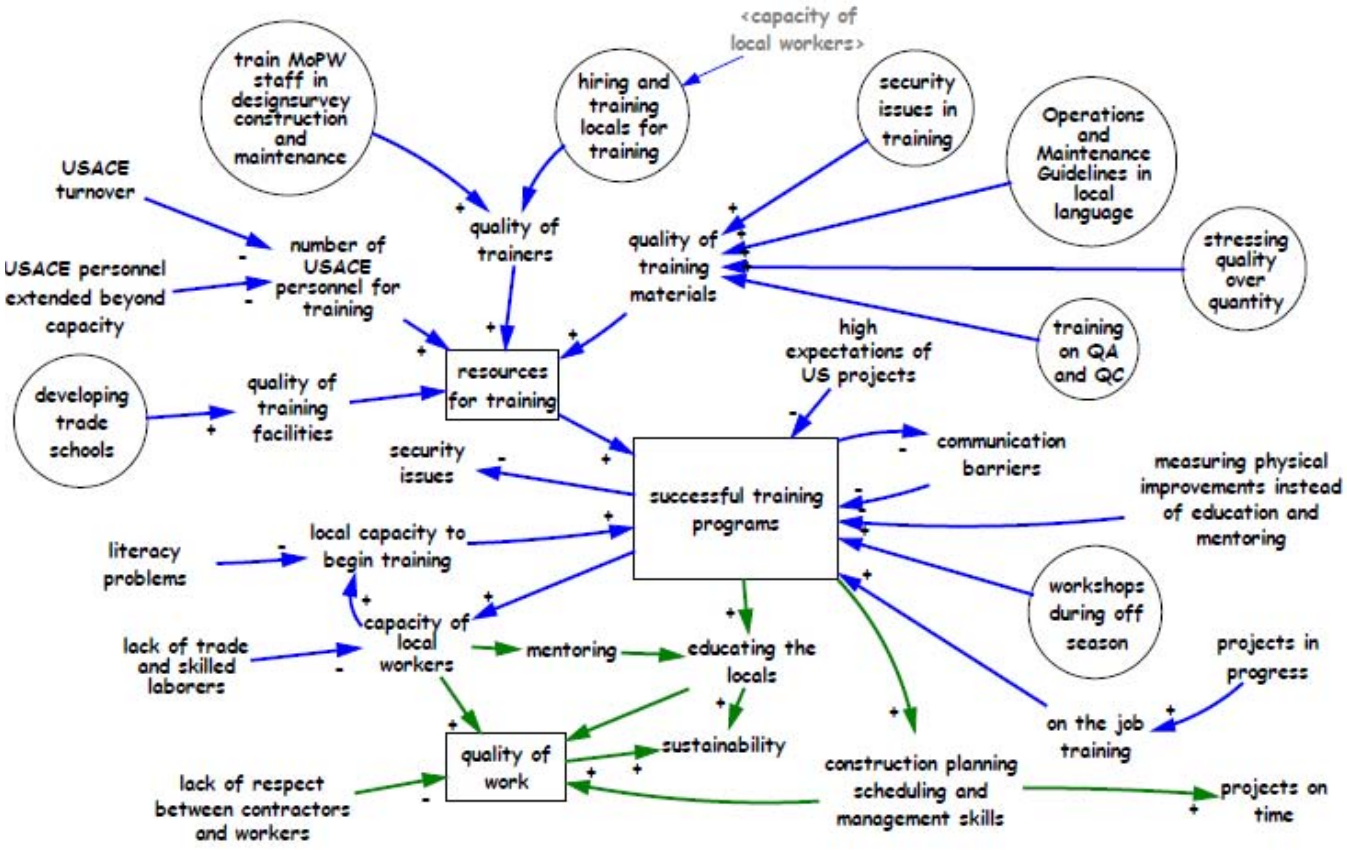
P-S	Total Count	Contracts: Problems & Solutions
S	2	There should be tier level of contract system
S	2	Locals require teaching, coaching and mentoring (i.e. contract management for engineers, ethics)
S	2	Arrangement for more involvement of government ministries, such as MoPW, in overseeing the bidding process and construction work
S	2	Realistic anticipation of delays included in contracts (weather, security, local olidays, etc.)
S	2	Select contractor with qualified staff and past experience
S	2	Coalition military(ies) need to contribute to security
S	2	Selecting contractor with good financial buffer or has funding capacity
S	2	Cross-over and overlap of personnel & record keeping
S	1	Give credit joint ventures w/ int'l firms
S	1	A way to cope the human error and discontinuity
S	1	USACE Reachback should be maximized for contigency support
S	1	USACE can supply in-country engineering input to PM early in the decision process and for site selection
S	1	USACE should only deploy very few critical positions. PMs, lawyers and cost engineers can be located back in the States. Implement flex time and extended hours to accommodate with time differences .
S	1	Quality and Cost Base Selection (QCBS) method well
S	1	Design review should be reviewed and conducted by consistent team or the same persons throughout the time
S	1	Use firm fixed price in contracts
S	1	Small business administration for local firms
S	1	Hire local national to support USACE contracting office for continuity and capacity development
S	1	Maintain a contractor list or database of qualified personnel
S	1	Emphasize the BCOE by providing the field adequate time to conduct the BCOE process properly and interface with the end user to address the operability
S	1	Differential expectation for large & small projects
S	1	Improve process for design review and inspection

Quality Control/Quality Assurance



P-S	Total Count	Quality Assurance: Problems & Solutions
P	3	Basic QA knowledge of USACE personnel in area of responsibility limited to different backgrounds.
P	3	Access to work sites for QC/QA: security & logistics
P	2	Inspection period made available by contractors for QA before construction proceeds has not been adequate.
P	2	Contractor Quality and Management (CQM) paperwork is difficult to follow which impacts material selection and design
P	1	Unsupervised work by contractor affecting QC producing hidden substandard structure then covered it up.
P	1	Calibrations of testing equipment
P	1	Quality suffers to meet schedule deadline
P	1	Use of non-US material without modified guidance/standards affects quality and should require additional testing.
P	1	Contractor telling you what you want to hear.
P	1	Do not follow design requirements for financial gain
P	1	Poor design and QA affect O&M
P	1	QC report not realistic in some cases.
P	1	Concrete segregation/voids hard to catch.
P	1	Tests have not been conducted because the contractor runs short of money.
S	3	Hiring Afghans or locals for QA/QC
S	3	Afghan test facilities and testing capabilities have improved
S	3	In some locations laboratory facilities are reliable
S	3	USACE have trained Afghans well
S	3	USACE inspected and approved Afghan laboratories and test equipment with great success
S	2	International experts working with locals on site to learn and improve construction quality and worked well (partnership!)
S	1	In recent years, concrete batch plants have been established, producing good quality concrete
S	1	Site inspection daily or timely
S	1	Verification of QA/QC results to control falsifications
S	1	Military personnel to involve in construction projects for getting eyes on in a dangerous part of the country
S	1	Training/Shadowing for military personnel for QA/QC
S	1	To get good information QA personnel need to be crafty in asking the contractors questions
S	1	Protect local natural inspectors from harassment and intimidation by claiming
S	1	Following standards requires paying attention and applying personnel insight
S	1	Frequent calibrations of density gages

Education

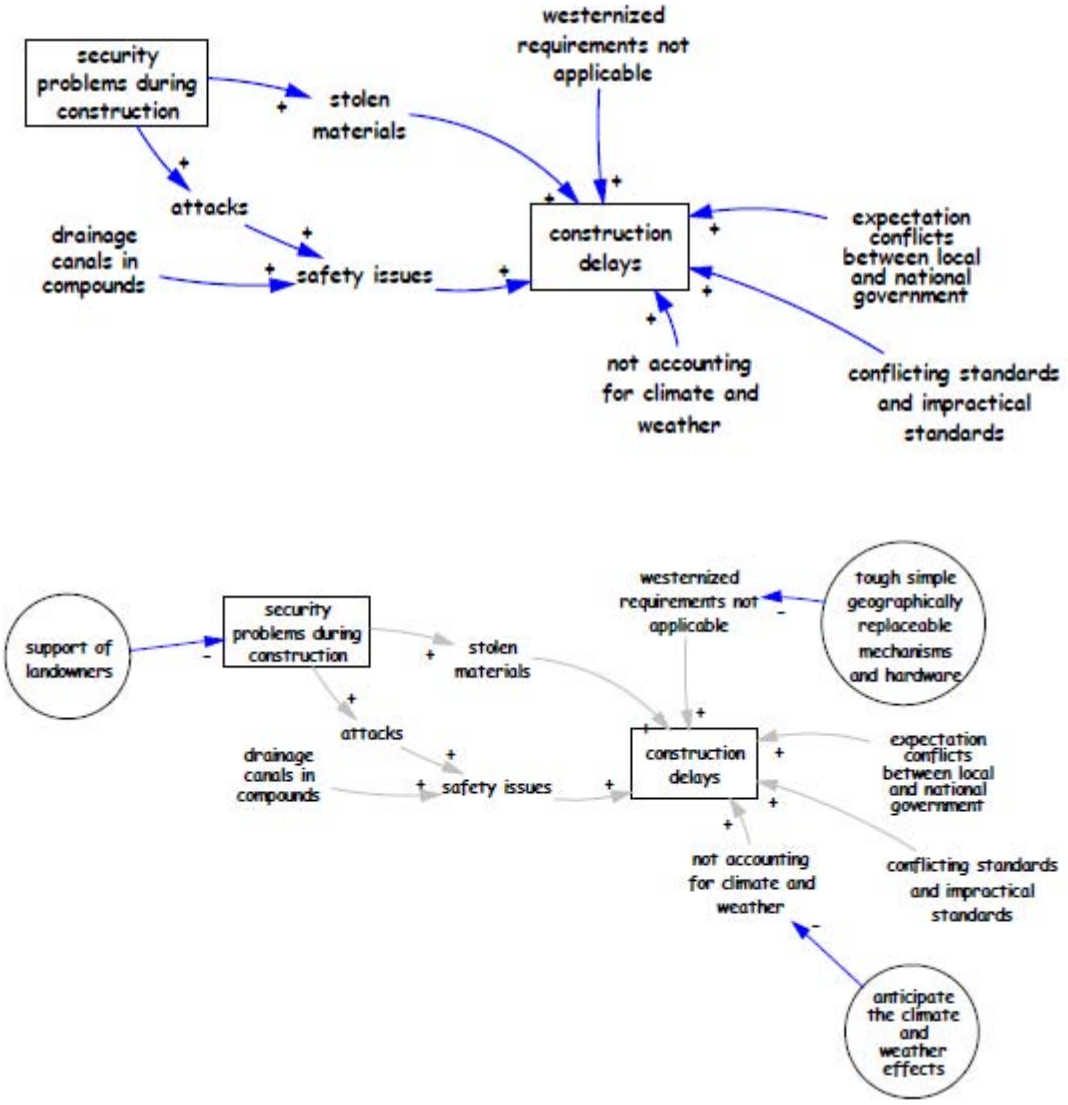

<capacity of local workers>
train MoPW staff in designsurvey construction and maintenance
hiring and training locals for training
security issues in training
Operations and Maintenance Guidelines in local language
USACE turnover
quality of trainers
quality of training materials
stressing quality over quantity
USACE personnel extended beyond capacity
number of USACE personnel for training
training on QA and QC
high expectations of US projects
developing trade schools
quality of training facilities
resources for training
communication barriers
security issues
successful training programs
measuring physical improvements instead of education and mentoring
literacy problems
local capacity to begin training
workshops during off season
capacity of local workers
lack of trade and skilled laborers
mentoring
educating the locals
projects in progress
on the job training
quality of work
sustainability
lack of respect between contractors and workers
construction planning scheduling and management skills
projects on time

P-S	Total Count	Education: Problems & Solutions
P	3	Lack of construction planning, scheduling and management skills of local national
P	2	Training and mentoring local is difficult because of over tasked USACE personnel
P	2	Journeymen-skills were not initially available among Afghans
P	1	Lack of communication and setting expectation for local national
P	1	Education on contracts, business process, ethics, decision making, planning are lacking
P	1	Success is measured by physical improvements NOT mentoring /education
P	1	Literacy
P	1	High USACE personnel turn-over and R&R affects training continuity to locals
P	1	Relationship issues between contractor and workers, respect
S	7	Require on-the-job training
S	3	Develop trade school and specialized training (geotech, surveying, etc.)
S	3	Hiring and training locals for QA and other engineering related tasks
S	2	Train Afghan companies how to make and implement of quality control plans and specifications
S	2	Train the local labor and masons for different activities
S	2	Training and educating of community to help with security
S	2	Run workshops on constructions methods and project management during off-season, including local and international construction methods
S	2	Teaching, coaching, mentoring has to be part of everyone's job
S	2	Hiring specific tasker for mentoring and training.
S	1	Active participation and interaction with trainees and workers
S	1	Develop suitable training facilities taught by qualified professional trainers for the target audience
S	1	Develop classroom materials
S	1	Orientation for workers before construction starts to elaborate project goals, government regulations, safety, technical information, punctuality, honesty, etc.
S	1	Provide on-the-job or hands-on training at facility deliver time or during hand-off
S	1	Training video or O&M using local national languages
S	1	Train machine operator for safety
S	1	Stress quality workmanship is better than quantity
S	1	Make short term courses in some new topics for Afghan engineers
S	1	Train Afghan companies in design
S	1	Train Afghan companies in RMS and QCS software
S	1	Awareness that Afghans may lack technical knowledge
S	1	Train the local Afghan staff (MoPW employees) in design, surveying, construction, and maintenance
S	1	Provide operation and maintenance guide and manuals for facility

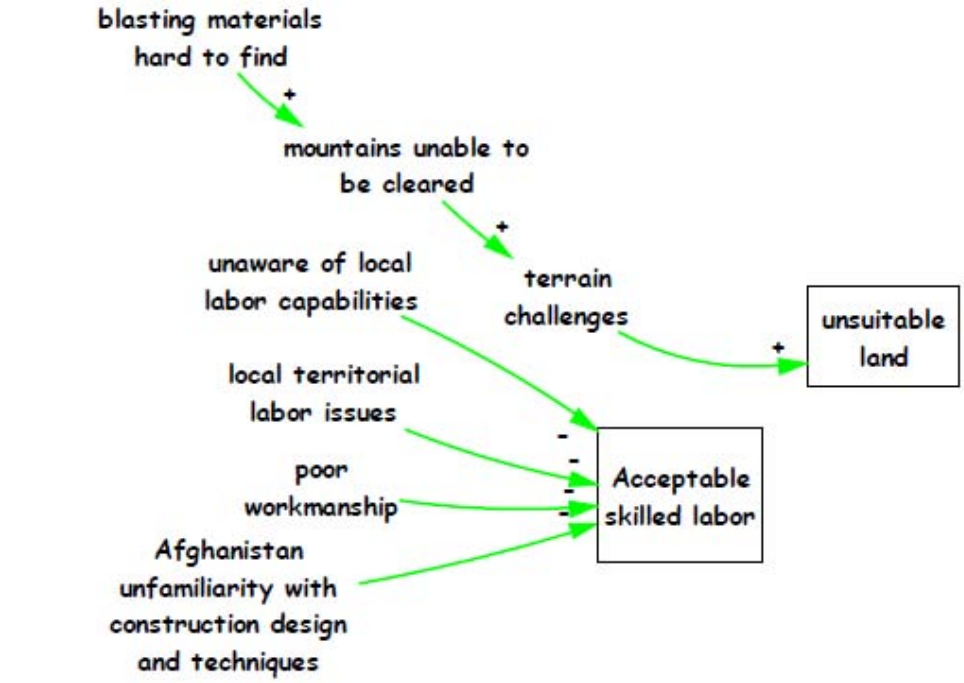
Causal Maps

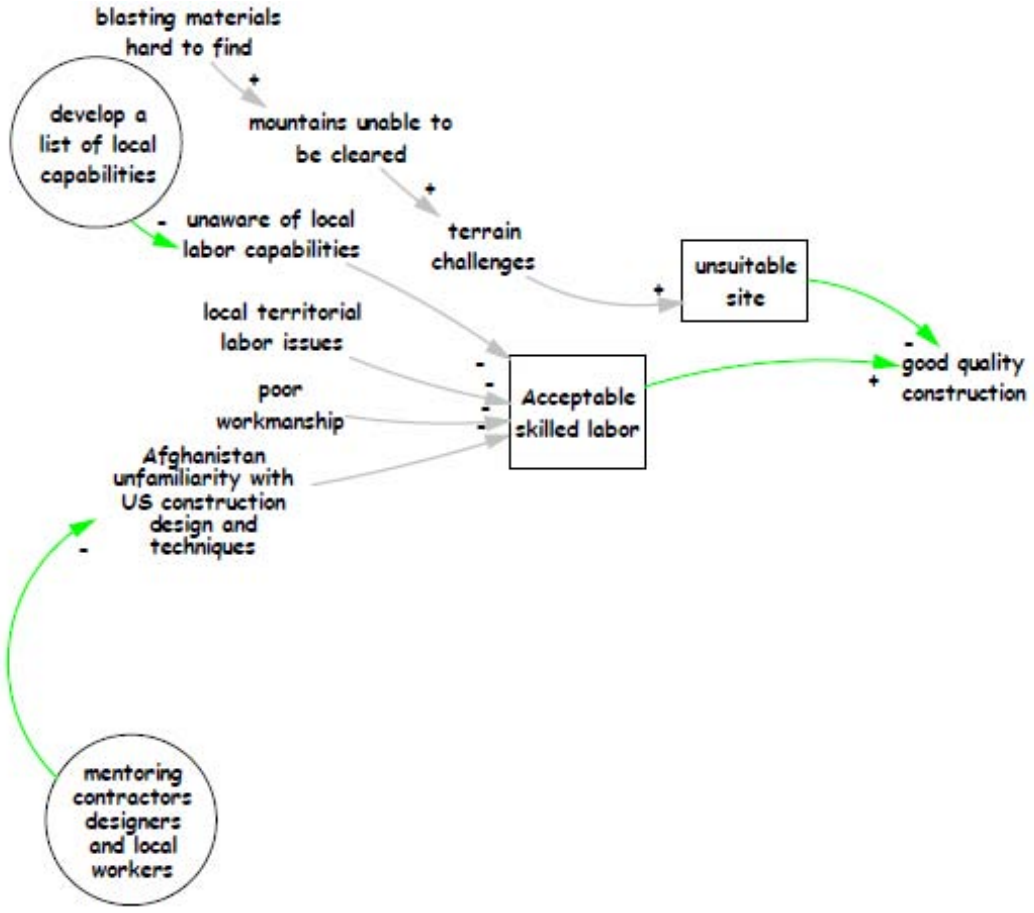
Design and Construction

Construction Delays and Security Problems

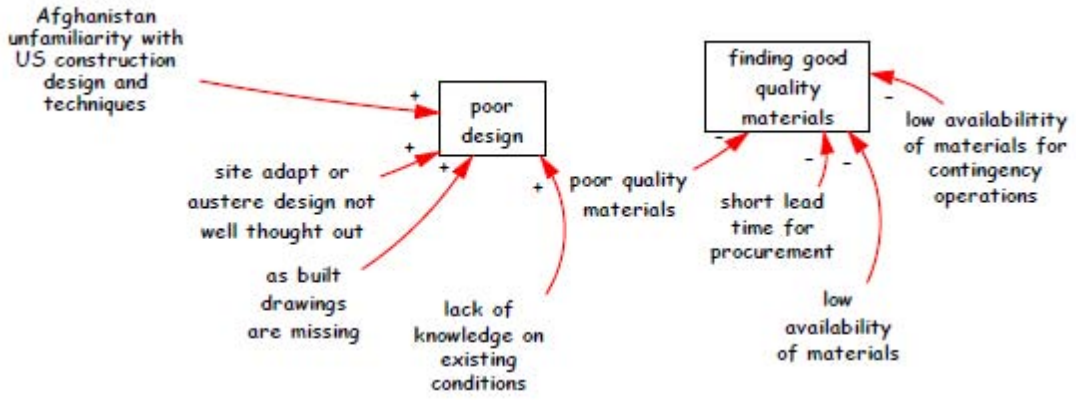


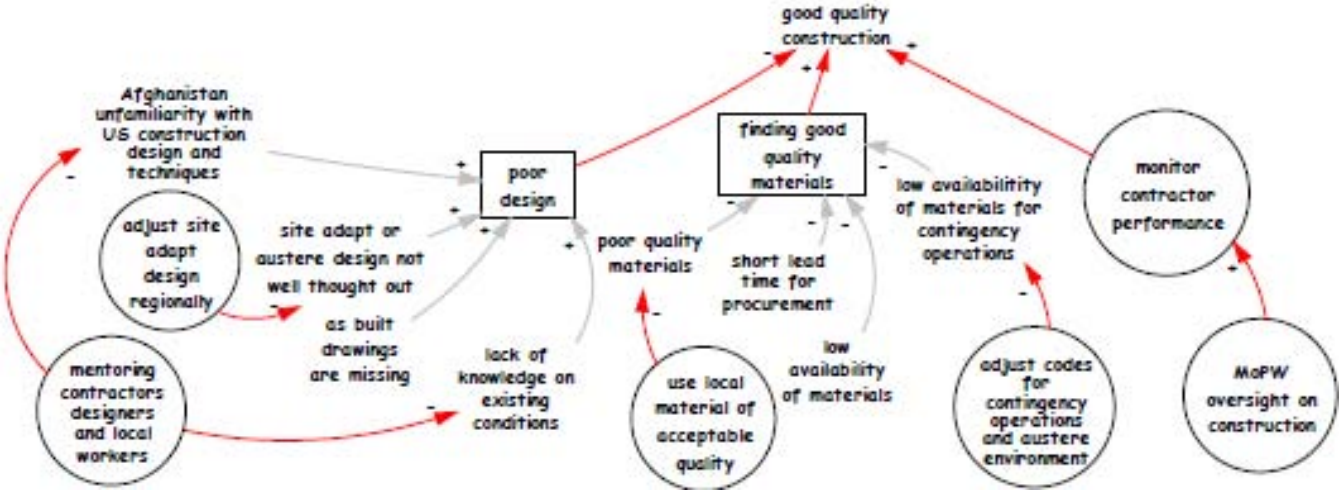
Labor and Land Suitability

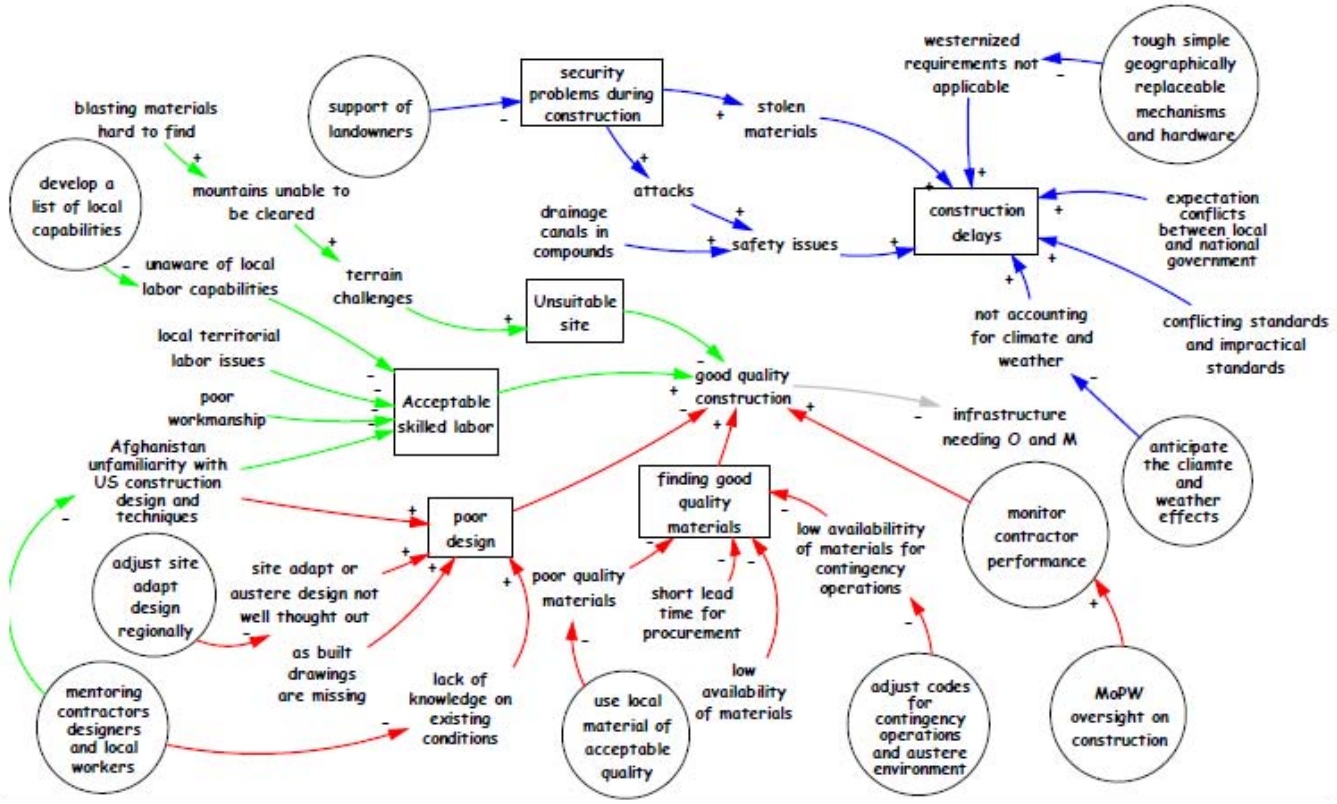




Poor Design and Finding Good Quality Materials

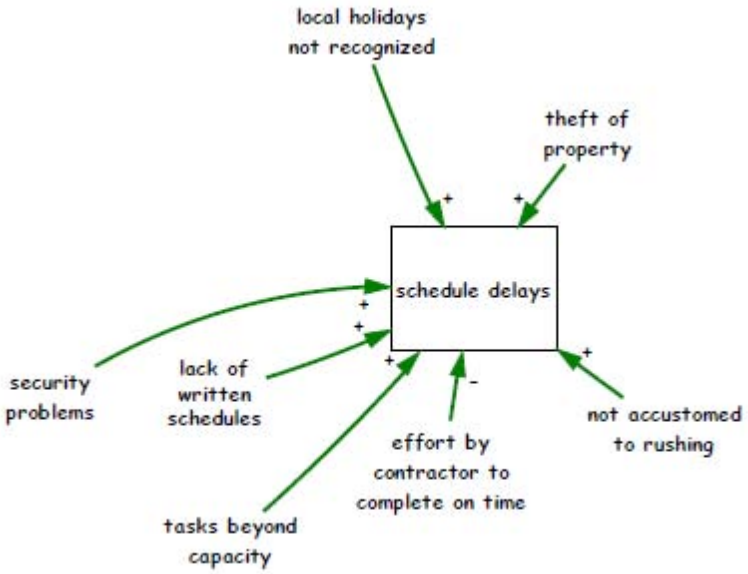


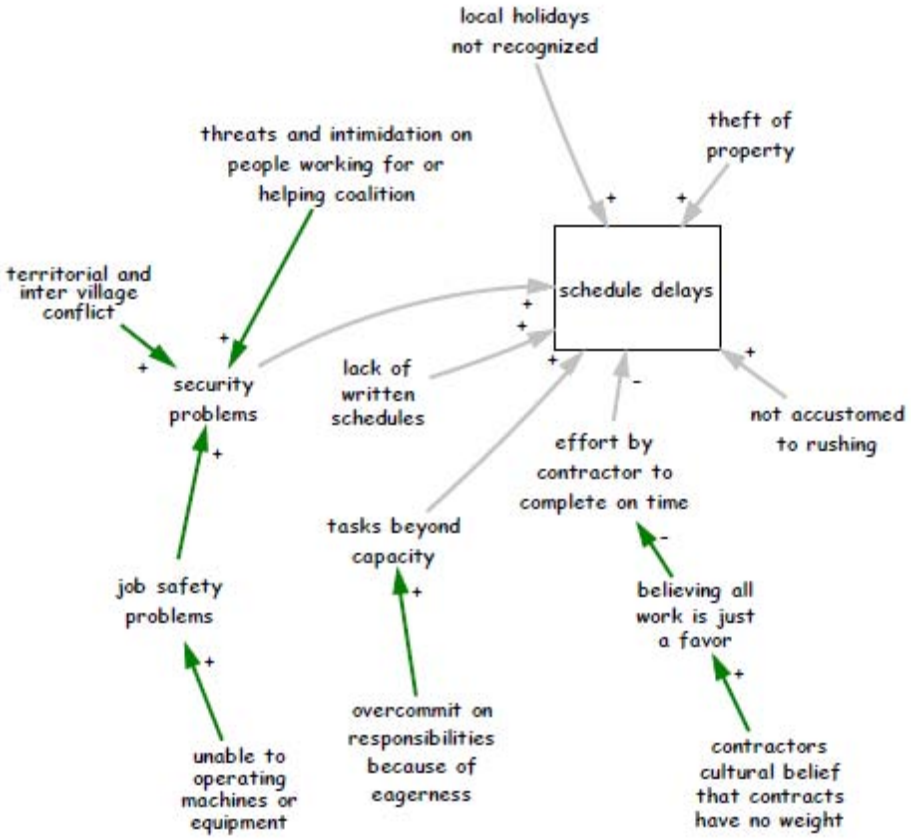


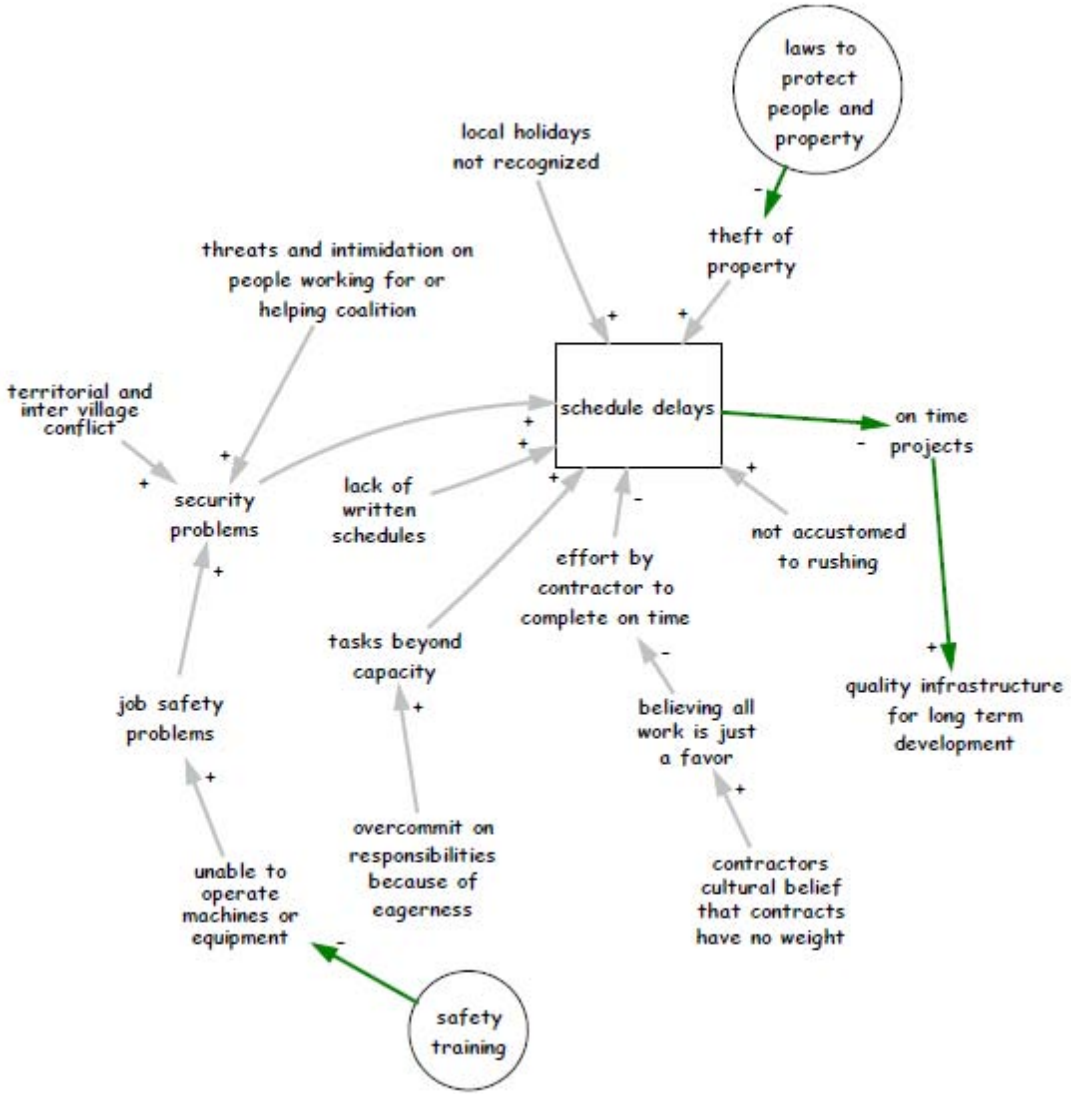

westernized requirements not applicable
tough simple geographically replaceable mechanisms and hardware
blasting materials hard to find
support of landowners
security problems during construction
stolen materials
develop a list of local capabilities
mountains unable to be cleared
attacks
drainage canals in compounds
safety issues
construction delays
expectation conflicts between local and national government
unaware of local labor capabilities
terrain challenges
Unsuitable site
not accounting for climate and weather
conflicting standards and impractical standards
local territorial labor issues
poor workmanship
Acceptable skilled labor
good quality construction
infrastructure needing O and M
anticipate the cliamte and weather effects
Afghanistan unfamiliarity with US construction design and techniques
poor design
finding good quality materials
low availabilitity of materials for contingency operations
monitor contractor performance
adjust site adapt design regionally
site adapt or austere design not well thought out
poor quality materials
short lead time for procurement
as built drawings are missing
lack of knowledge on existing conditions
use local material of acceptable quality
low availability of materials
adjust codes for contingency operations and austere environment
MoPW oversight on construction
mentoring contractors designers and local workers

Cultural Issues

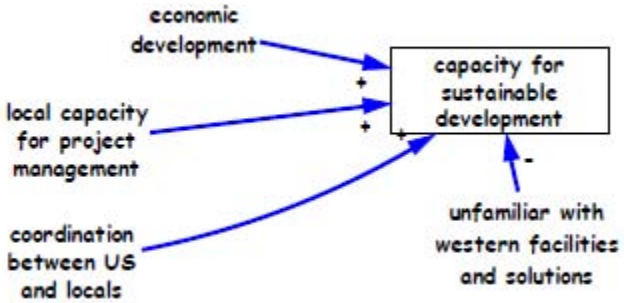
Schedule Delays

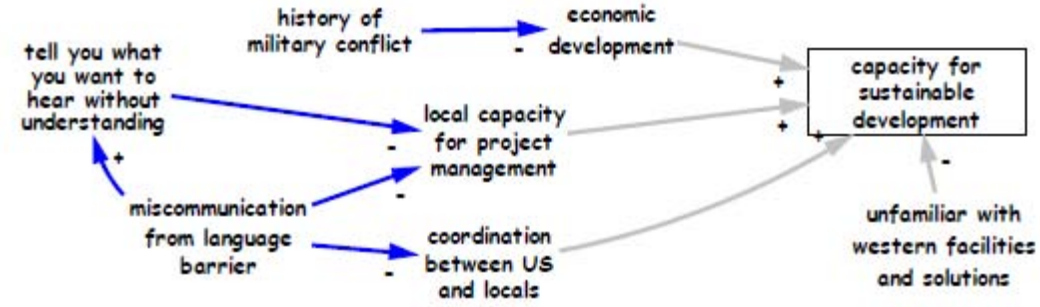


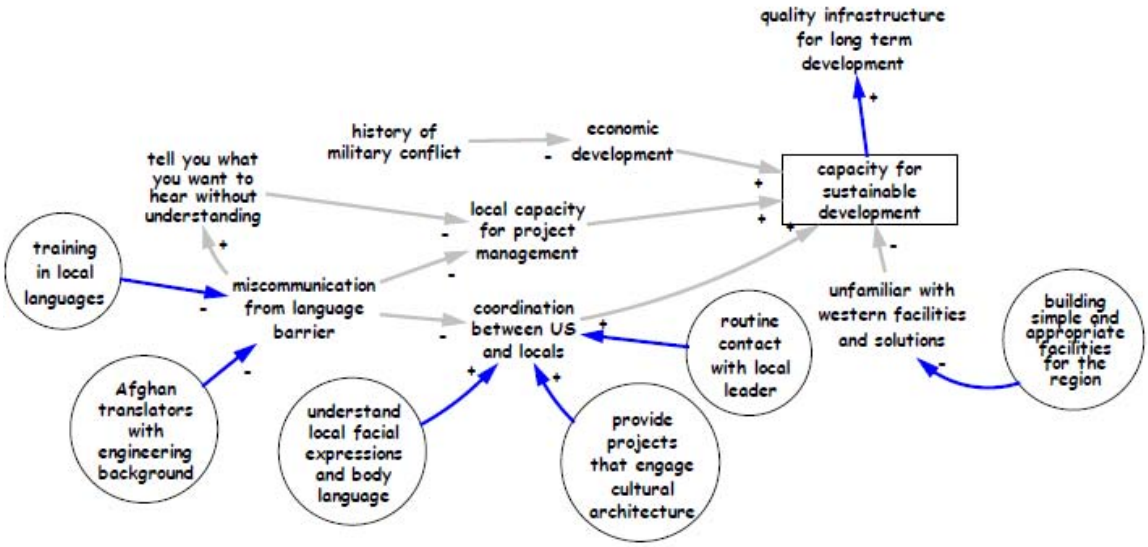


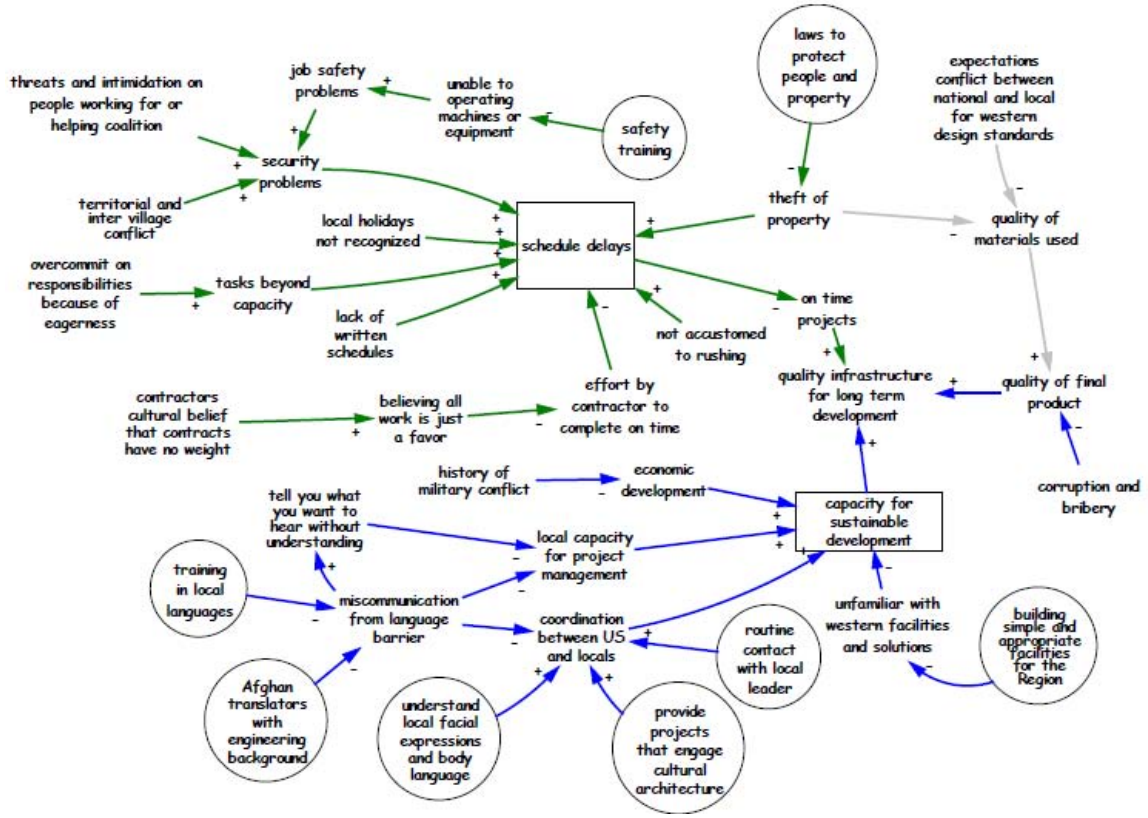


Capacity for Sustainable Development




history of military conflict
economic development
tell you what you want to hear without understanding
capacity for sustainable development
local capacity for project management
miscommunication from language barrier
coordination between US and locals
unfamiliar with western facilities and solutions


quality infrastructure for long term development
history of military conflict
economic development
tell you what you want to hear without understanding
capacity for sustainable development
local capacity for project management
training in local languages
miscommunication from language barrier
coordination between US and locals
unfamiliar with western facilities and solutions
routine contact with local leader
building simple and appropriate facilities for the region
Afghan translators with engineering background
understand local facial expressions and body language
provide projects that engage cultural architecture


threats and intimidation on people working for or helping coalition
job safety problems
unable to operating machines or equipment
safety training
laws to protect people and property
expectations conflict between national and local for western design standards
security problems
territorial and inter village conflict
local holidays not recognized
schedule delays
theft of property
quality of materials used
overcommit on responsibilities because of eagerness
tasks beyond capacity
lack of written schedules
not accustomed to rushing
on time projects
quality infrastructure for long term development
quality of final product
contractors cultural belief that contracts have no weight
believing all work is just a favor
effort by contractor to complete on time
corruption and bribery
history of military conflict
economic development
capacity for sustainable development
tell you what you want to hear without understanding
local capacity for project management
training in local languages
miscommunication from language barrier
coordination between US and locals
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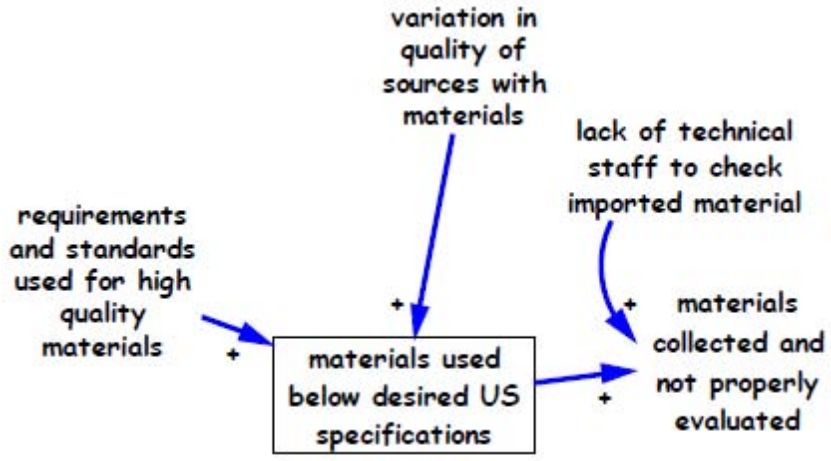
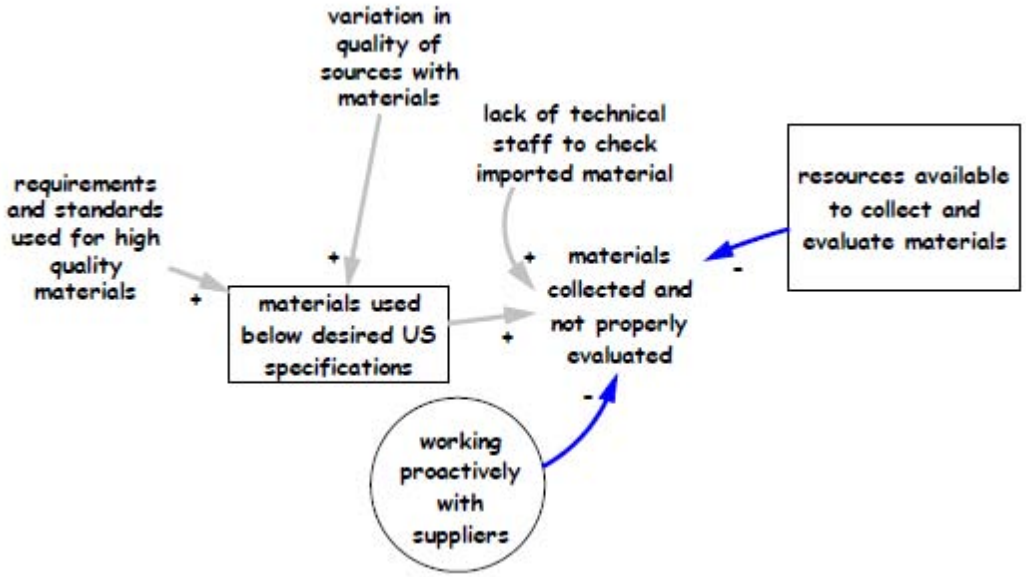
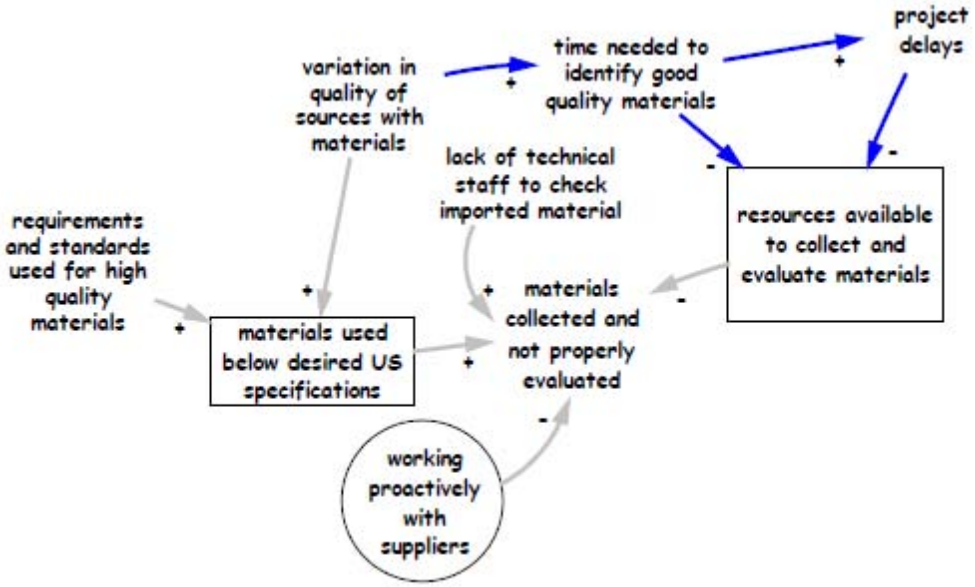

variation in quality of sources with materials
lack of technical staff to check imported material
requirements and standards used for high quality materials
materials used below desired US specifications
materials collected and not properly evaluated


variation in quality of sources with materials
lack of technical staff to check imported material
requirements and standards used for high quality materials
resources available to collect and evaluate materials
materials collected and not properly evaluated
materials used below desired US specifications
working proactively with suppliers


project delays
time needed to identify good quality materials
variation in quality of sources with materials
lack of technical staff to check imported material
requirements and standards used for high quality materials
resources available to collect and evaluate materials
materials collected and not properly evaluated
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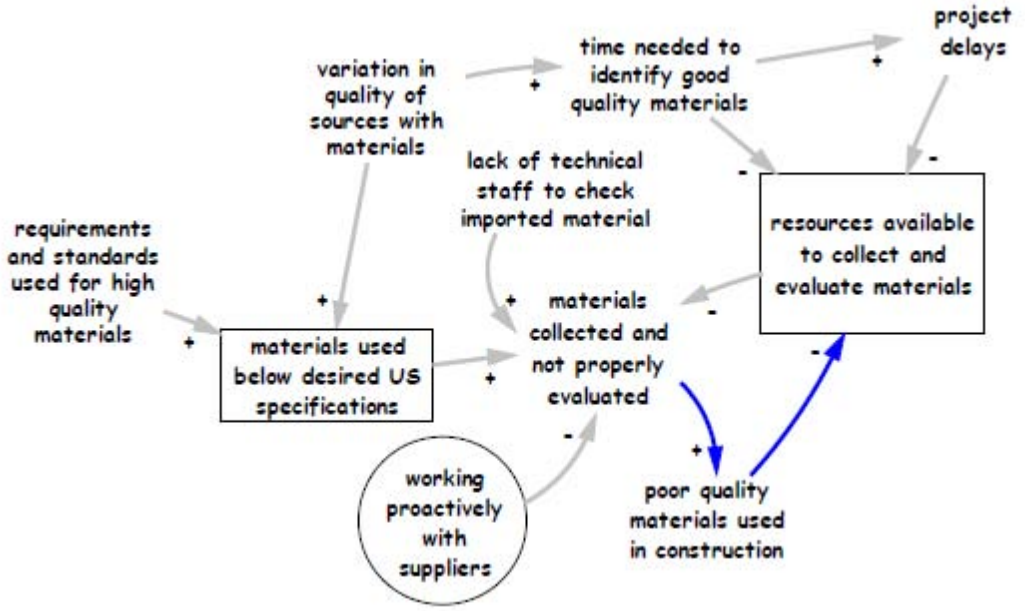
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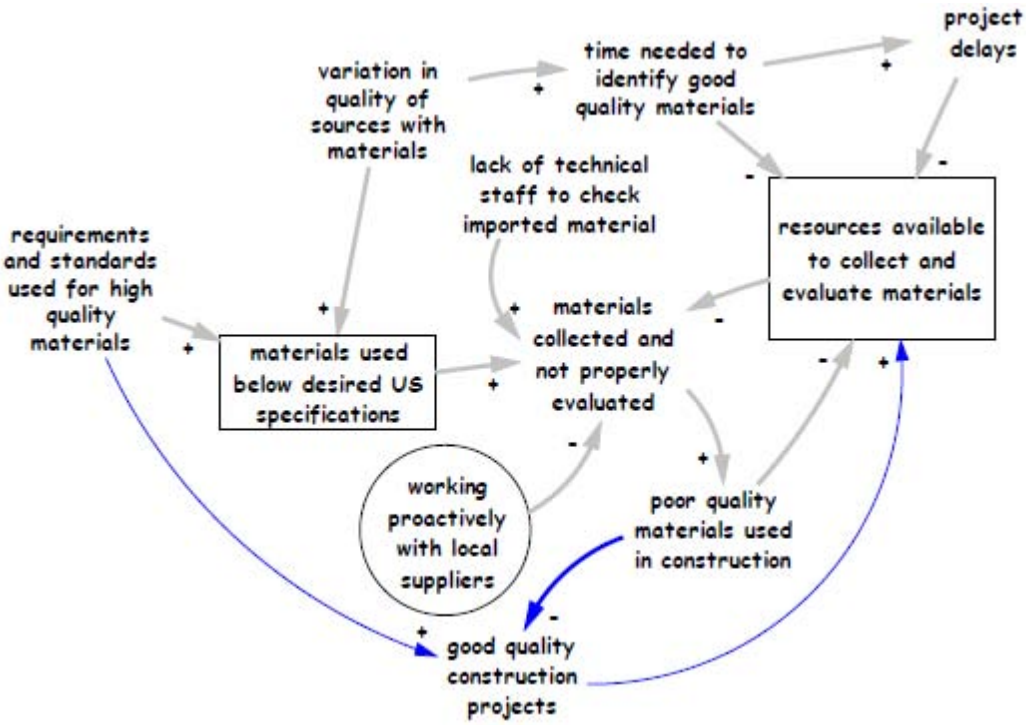
resources available to collect and evaluate materials
requirements and standards used for high quality materials
materials collected and not properly evaluated
materials used below desired US specifications
working proactively with suppliers
poor quality materials used in construction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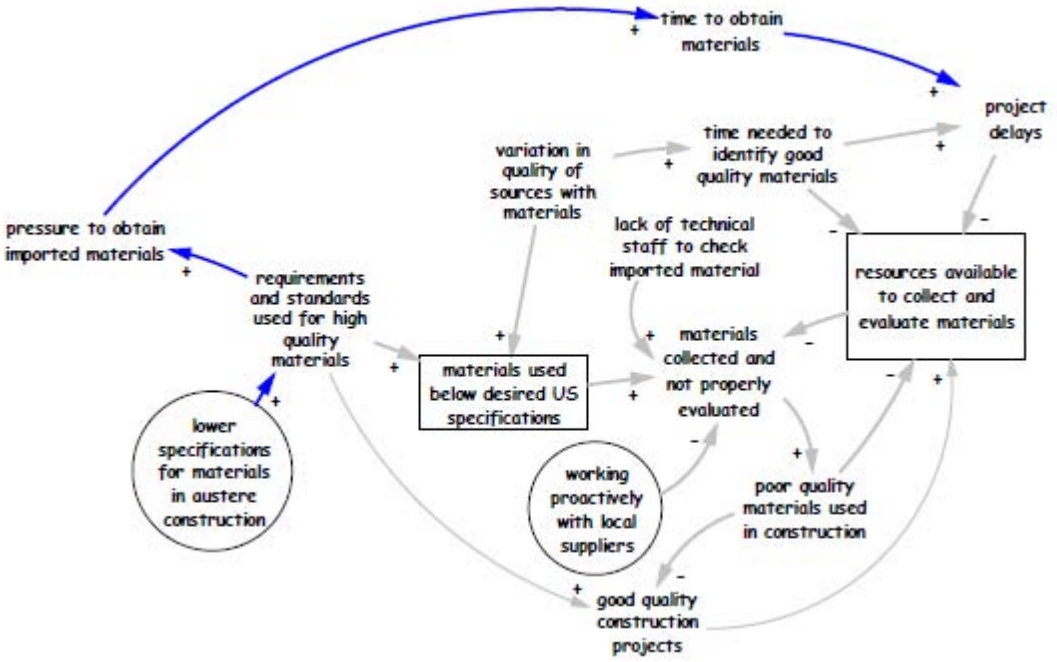
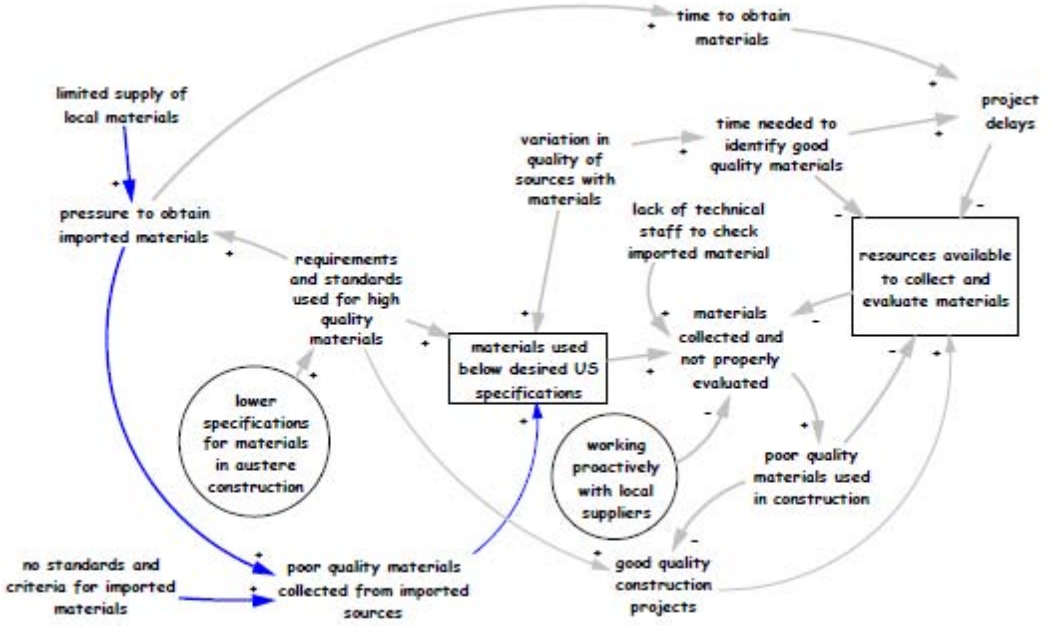
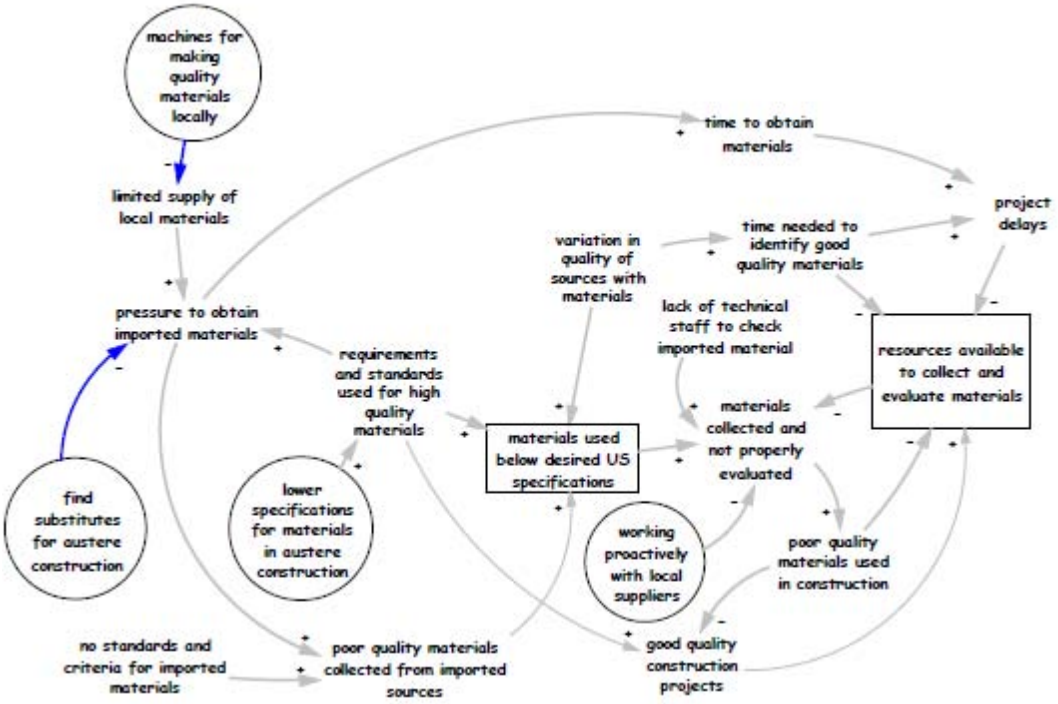
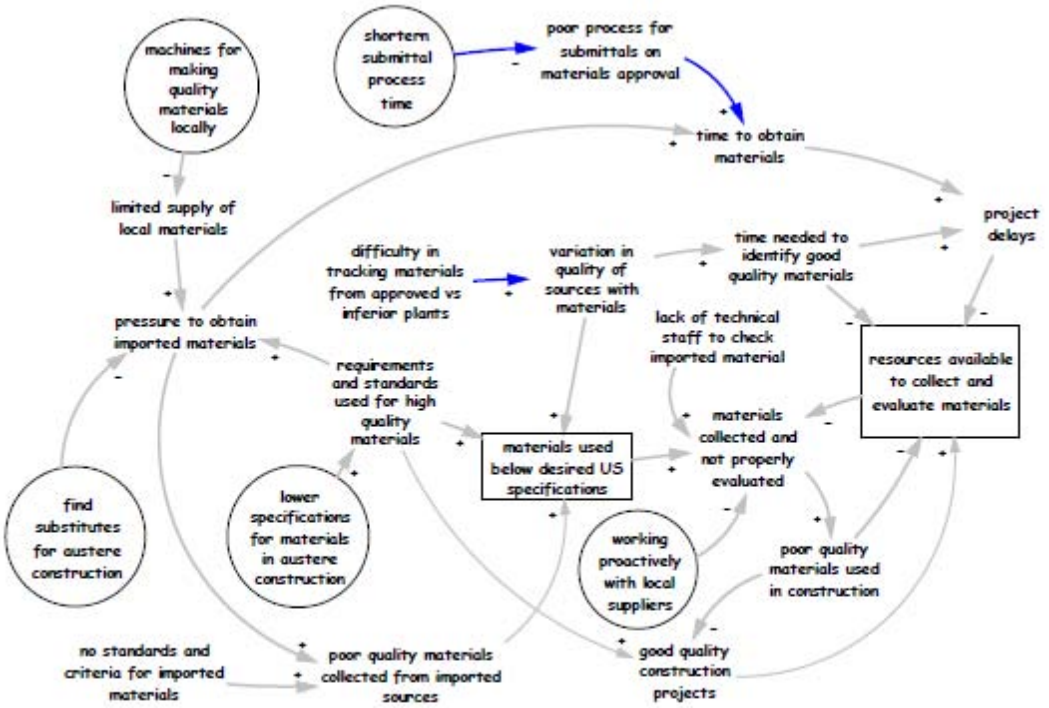
resources available to collect and evaluate materials
requirements and standards used for high quality materials
materials collected and not properly evaluated
materials used below desired US specifications
working proactively with local suppliers
poor quality materials used in construction
good quality construction projects


time to obtain materials
project delays
variation in quality of sources with materials
time needed to identify good quality materials
pressure to obtain imported materials
lack of technical staff to check imported material
resources available to collect and evaluate materials
requirements and standards used for high quality materials
materials collected and not properly evaluated
materials used below desired US specifications
lower specifications for materials in austere construction
working proactively with local suppliers
poor quality materials used in construction
good quality construction projects


time to obtain materials
limited supply of local materials
project delays
variation in quality of sources with materials
time needed to identify good quality materials
pressure to obtain imported materials
lack of technical staff to check imported material
resources available to collect and evaluate materials
requirements and standards used for high quality materials
materials collected and not properly evaluated
materials used below desired US specifications
lower specifications for materials in austere construction
working proactively with local suppliers
poor quality materials used in construction
no standards and criteria for imported materials
poor quality materials collected from imported sources
good quality construction projects


machines for making quality materials locally
limited supply of local materials
time to obtain materials
project delays
variation in quality of sources with materials
time needed to identify good quality materials
pressure to obtain imported materials
lack of technical staff to check imported material
resources available to collect and evaluate materials
requirements and standards used for high quality materials
materials collected and not properly evaluated
materials used below desired US specifications
find substitutes for austere construction
lower specifications for materials in austere construction
working proactively with local suppliers
poor quality materials used in construction
no standards and criteria for imported materials
poor quality materials collected from imported sources
good quality construction projects


machines for making quality materials locally
shortern submittal process time
poor process for submittals on materials approval
time to obtain materials
limited supply of local materials
project delays
difficulty in tracking materials from approved vs inferior plants
variation in quality of sources with materials
time needed to identify good quality materials
pressure to obtain imported materials
lack of technical staff to check imported material
resources available to collect and evaluate materials
requirements and standards used for high quality materials
materials collected and not properly evaluated
materials used below desired US specifications
find substitutes for austere construction
lower specifications for materials in austere construction
working proactively with local suppliers
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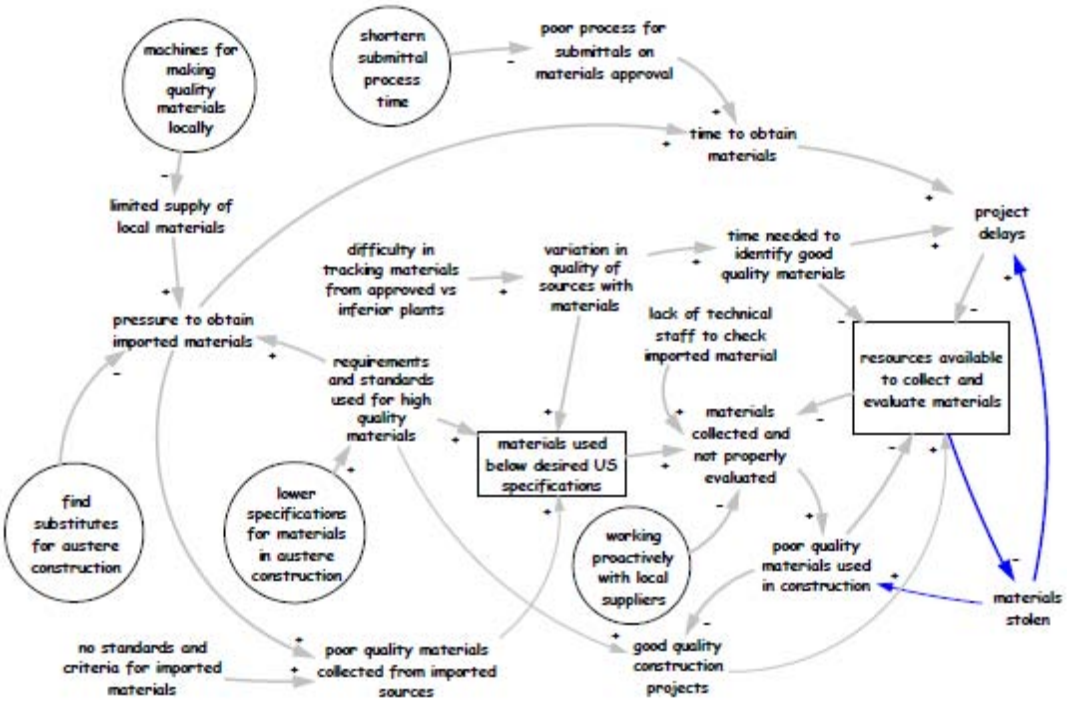
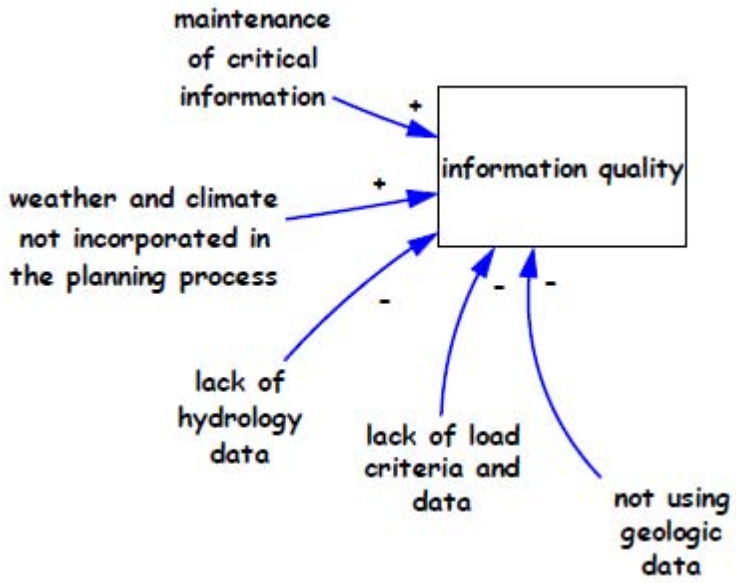
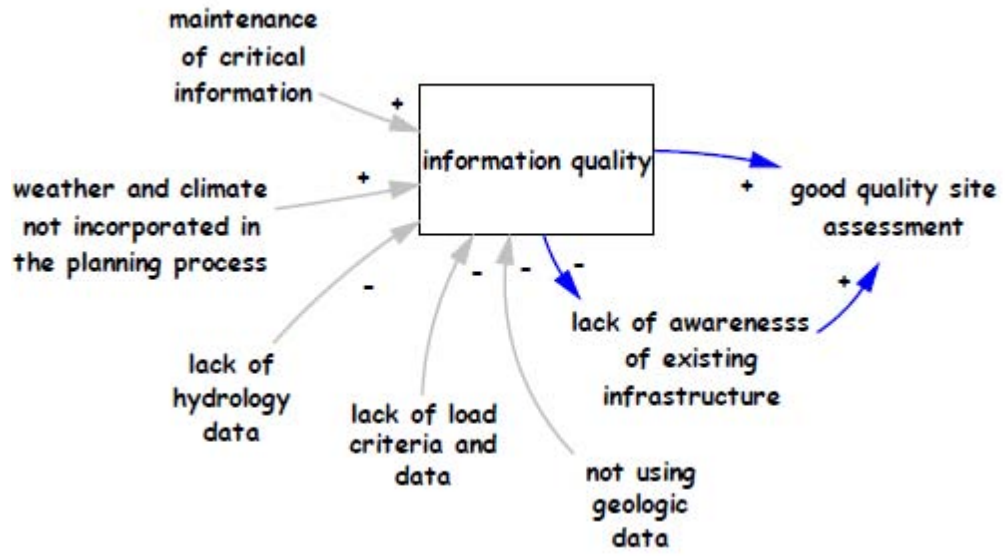
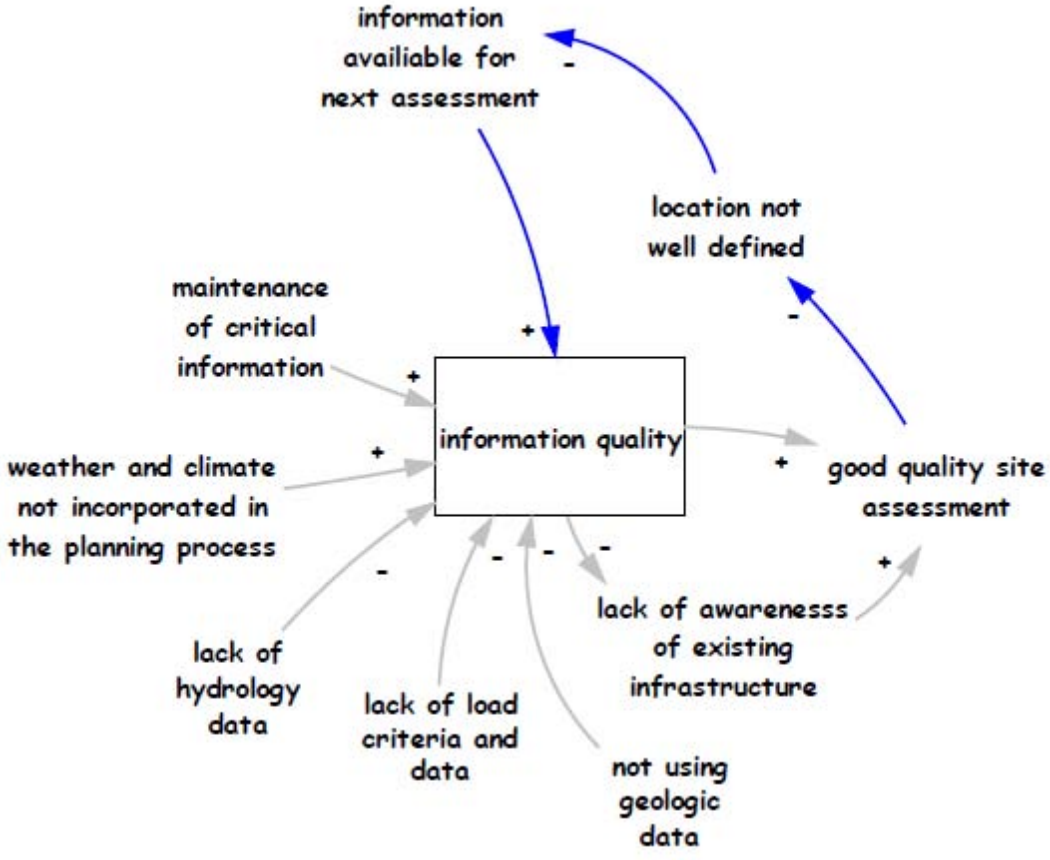
no standards and criteria for imported materials
poor quality materials collected from imported sources
good quality construction projects

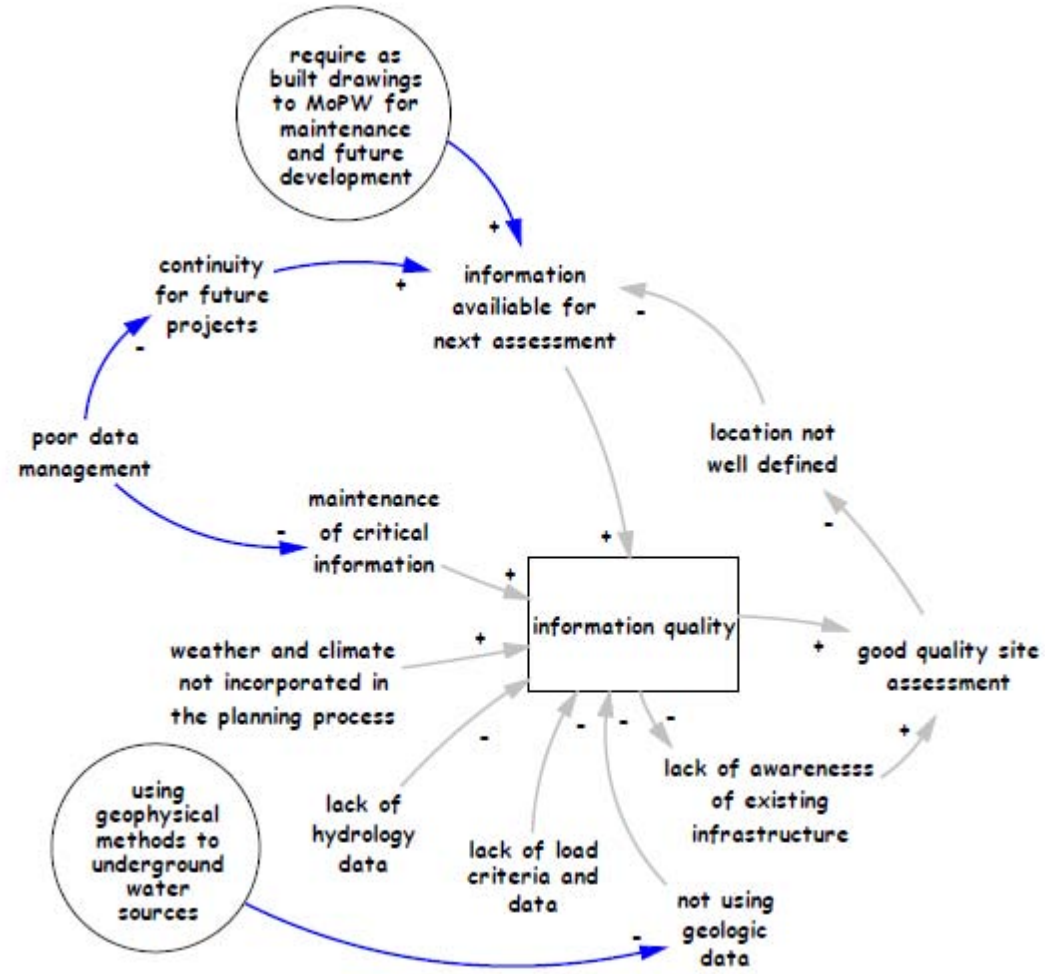


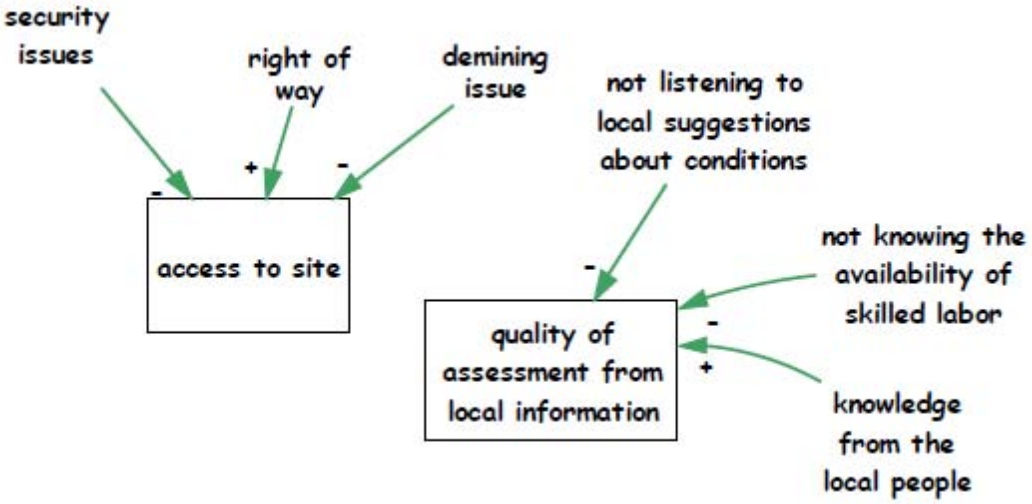
Site Assessment

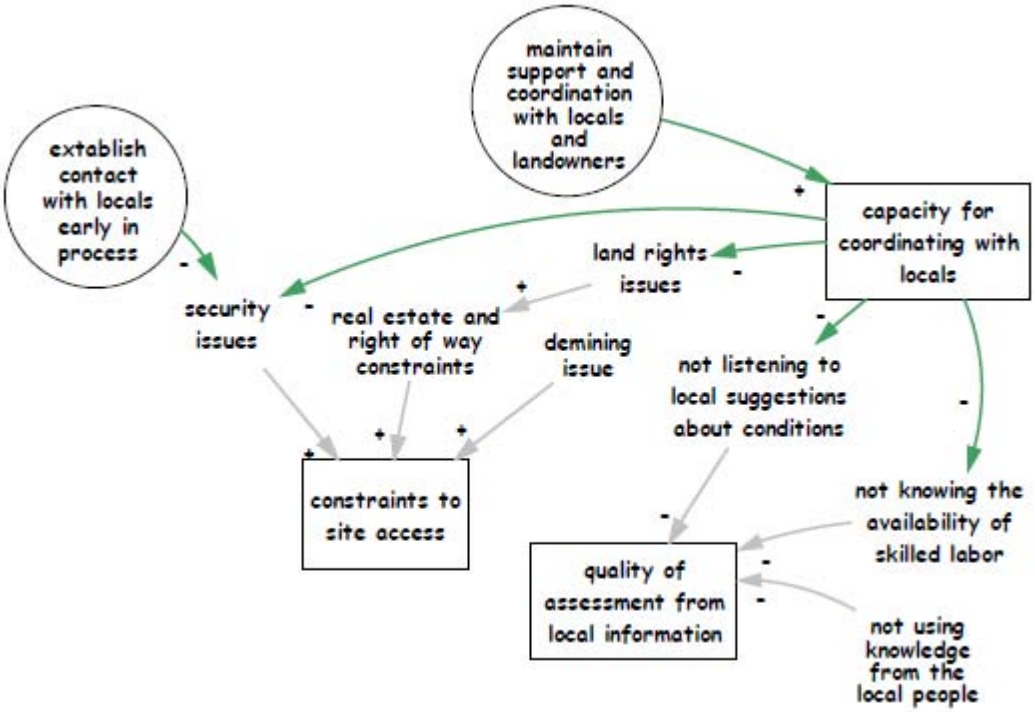


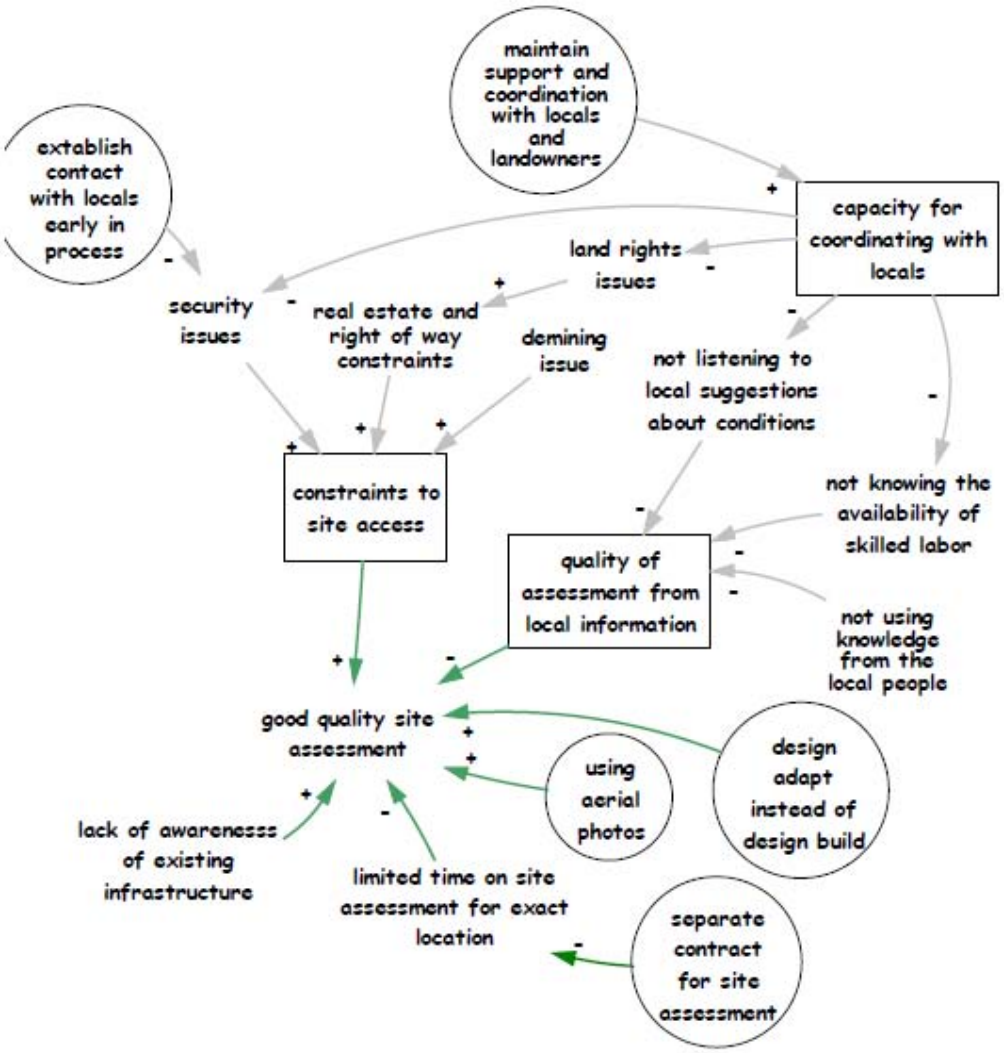

maintenance of critical information
weather and climate not incorporated in the planning process
information quality
good quality site assessment
lack of awarenesss of existing infrastructure
lack of hydrology data
lack of load criteria and data
not using geologic data

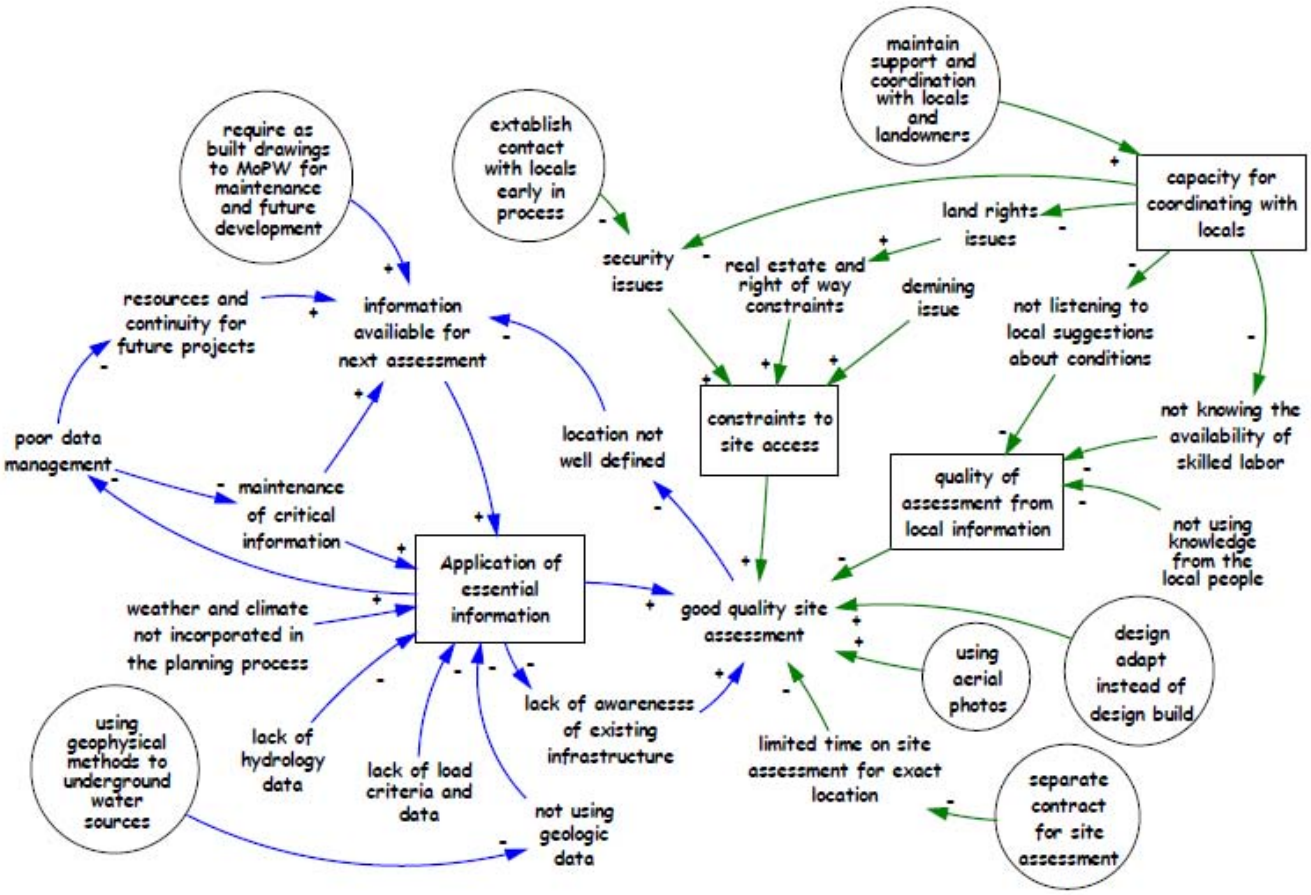

information availiable for next assessment
location not well defined
maintenance of critical information
weather and climate not incorporated in the planning process
information quality
good quality site assessment
lack of awarenesss of existing infrastructure
lack of hydrology data
lack of load criteria and data
not using geologic data


require as built drawings to MoPW for maintenance and future development
continuity for future projects
information availiable for next assessment
poor data management
location not well defined
maintenance of critical information
information quality
weather and climate not incorporated in the planning process
good quality site assessment
lack of awareness of existing infrastructure
using geophysical methods to underground water sources
lack of hydrology data
lack of load criteria and data
not using geologic data

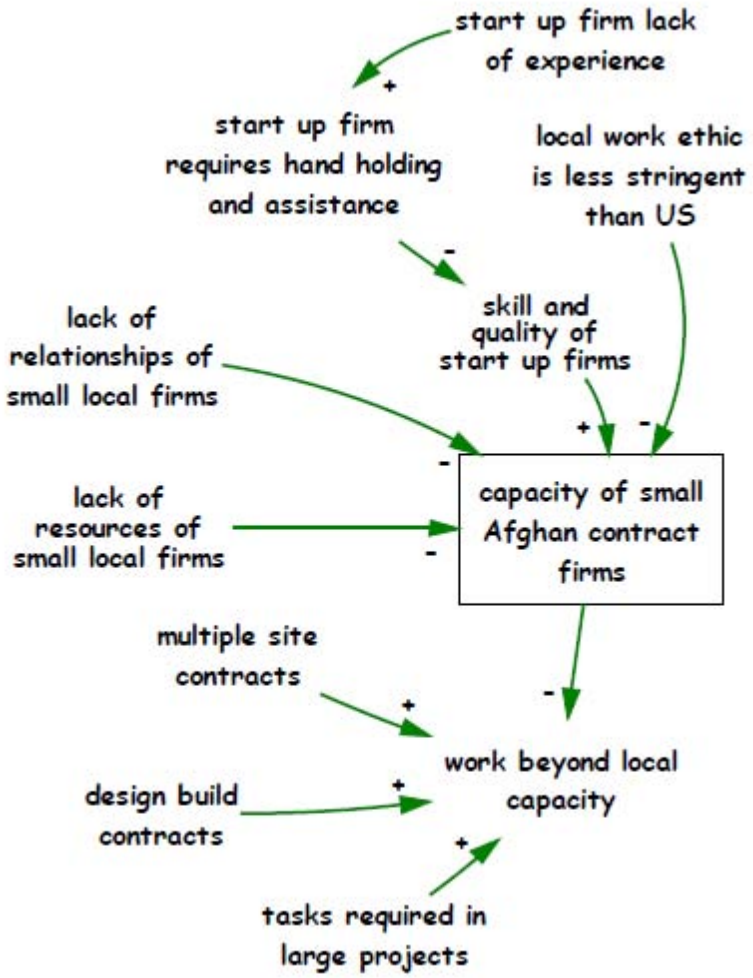

security issues
right of way
demining issue
access to site
not listening to local suggestions about conditions
not knowing the availability of skilled labor
quality of assessment from local information
knowledge from the local people

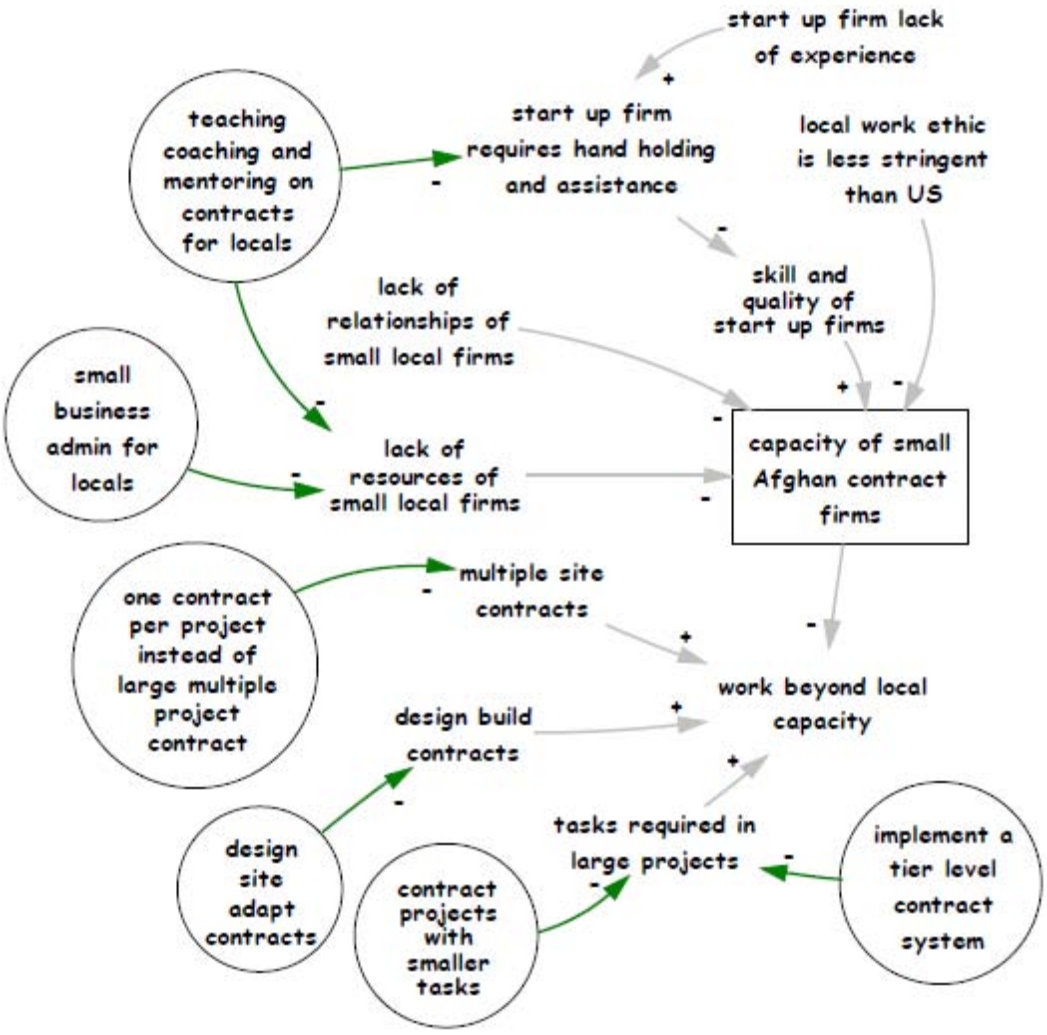

maintain support and coordination with locals and landowners
extablish contact with locals early in process
capacity for coordinating with locals
land rights issues
security issues
real estate and right of way constraints
demining issue
not listening to local suggestions about conditions
not knowing the availability of skilled labor
constraints to site access
quality of assessment from local information
not using knowledge from the local people

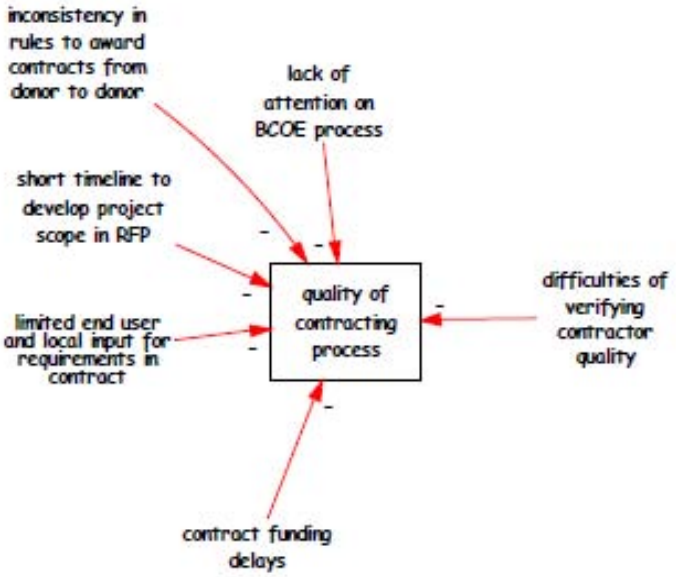

maintain support and coordination with locals and landowners
extablish contact with locals early in process
capacity for coordinating with locals
land rights issues
security issues
real estate and right of way constraints
demining issue
not listening to local suggestions about conditions
not knowing the availability of skilled labor
constraints to site access
quality of assessment from local information
not using knowledge from the local people
good quality site assessment
using aerial photos
design adapt instead of design build
lack of awareness of existing infrastructure
limited time on site assessment for exact location
separate contract for site assessment

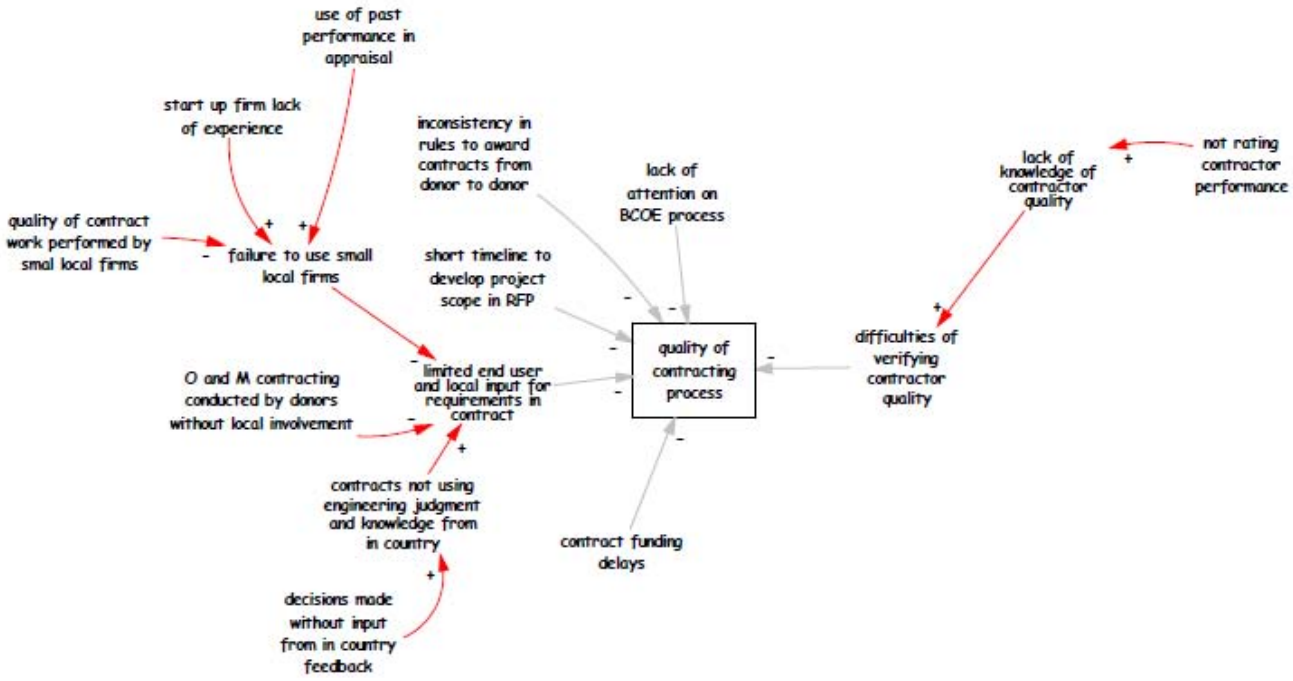

maintain support and coordination with locals and landowners
require as built drawings to MoPW for maintenance and future development
extablish contact with locals early in process
capacity for coordinating with locals
land rights issues
security issues
real estate and right of way constraints
demining issue
not listening to local suggestions about conditions
not knowing the availability of skilled labor
resources and continuity for future projects
information availiable for next assessment
constraints to site access
poor data management
location not well defined
quality of assessment from local information
maintenance of critical information
not using knowledge from the local people
Application of essential information
weather and climate not incorporated in the planning process
good quality site assessment
using aerial photos
design adapt instead of design build
using geophysical methods to underground water sources
lack of hydrology data
lack of load criteria and data
lack of awareness of existing infrastructure
limited time on site assessment for exact location
separate contract for site assessment
not using geologic data

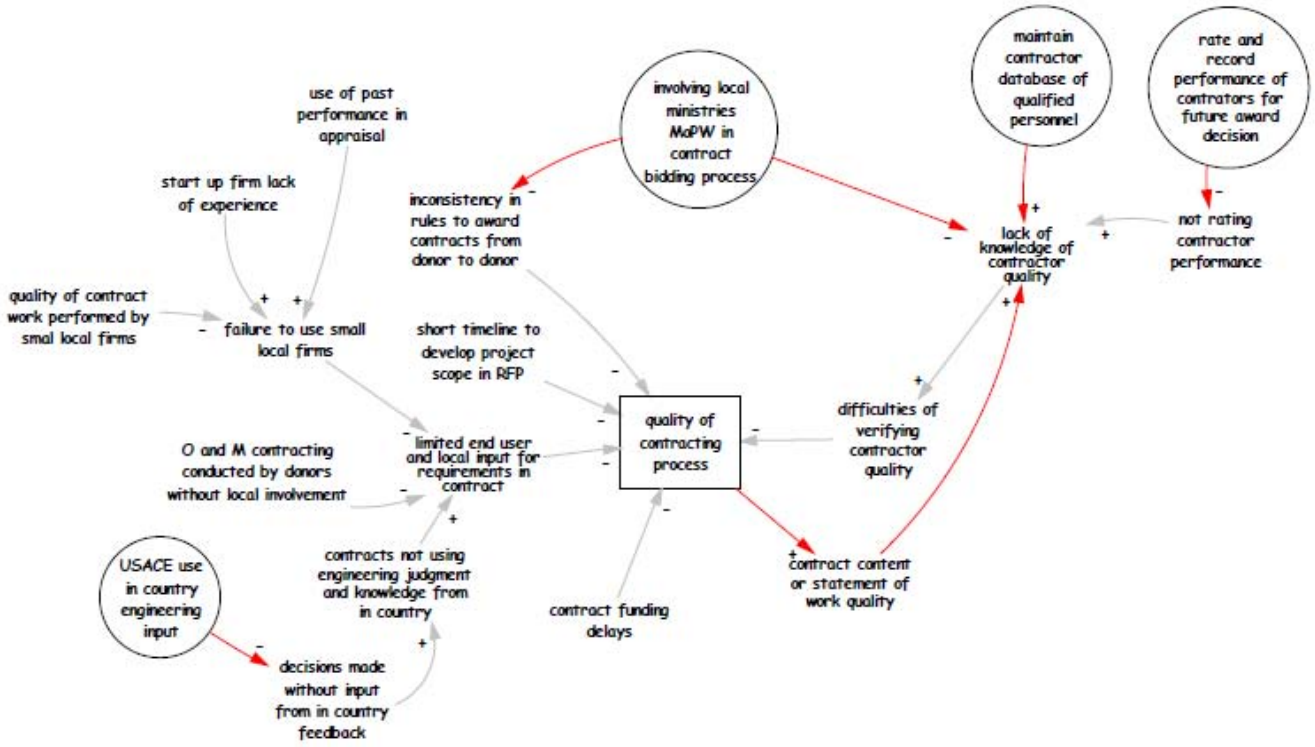
Contracts


start up firm lack of experience
+
start up firm requires hand holding and assistance
local work ethic is less stringent than US
-
skill and quality of start up firms
lack of relationships of small local firms
+
-
-
capacity of small Afghan contract firms
lack of resources of small local firms
-
multiple site contracts
-
+
work beyond local capacity
design build contracts
+
+
tasks required in large projects


start up firm lack of experience
teaching coaching and mentoring on contracts for locals
start up firm requires hand holding and assistance
local work ethic is less stringent than US
skill and quality of start up firms
lack of relationships of small local firms
small business admin for locals
lack of resources of small local firms
capacity of small Afghan contract firms
one contract per project instead of large multiple project contract
multiple site contracts
work beyond local capacity
design build contracts
design site adapt contracts
tasks required in large projects
implement a tier level contract system
contract projects with smaller tasks


inconsistency in rules to award contracts from donor to donor
lack of attention on BCOE process
short timeline to develop project scope in RFP
quality of contracting process
difficulties of verifying contractor quality
limited end user and local input for requirements in contract
contract funding delays


use of past performance in appraisal
start up firm lack of experience
inconsistency in rules to award contracts from donor to donor
lack of attention on BCOE process
lack of knowledge of contractor quality
not rating contractor performance
quality of contract work performed by smal local firms
failure to use small local firms
short timeline to develop project scope in RFP
quality of contracting process
difficulties of verifying contractor quality
O and M contracting conducted by donors without local involvement
limited end user and local input for requirements in contract
contracts not using engineering judgment and knowledge from in country
contract funding delays
decisions made without input from in country feedback


maintain contractor database of qualified personnel
rate and record performance of contrators for future award decision
involving local ministries MoPW in contract bidding process
use of past performance in appraisal
start up firm lack of experience
inconsistency in rules to award contracts from donor to donor
lack of knowledge of contractor quality
not rating contractor performance
quality of contract work performed by smal local firms
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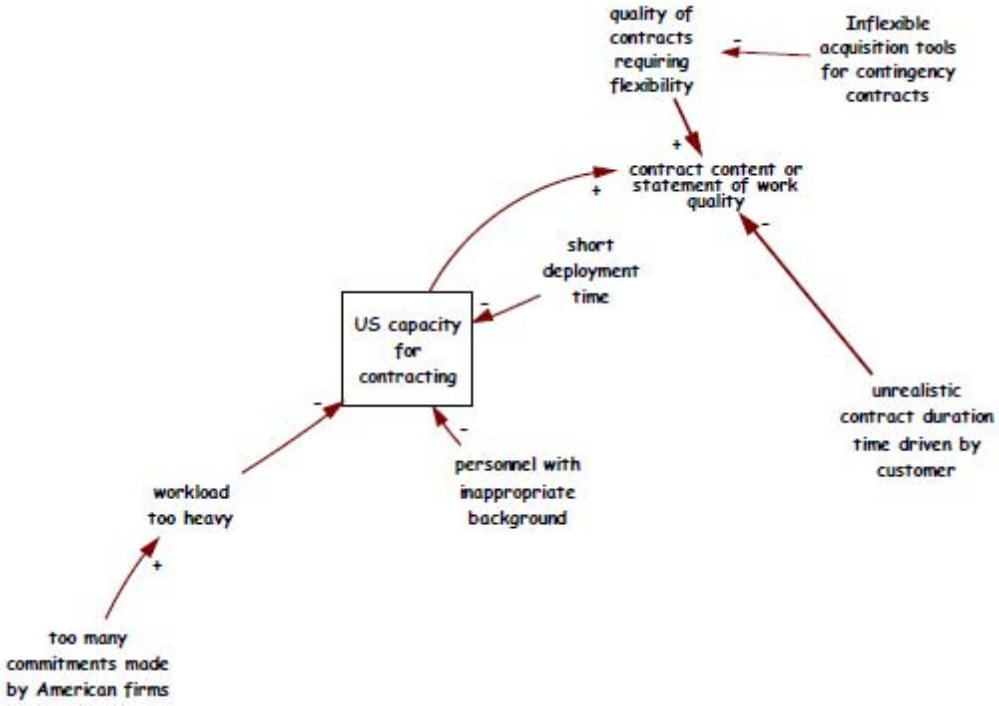
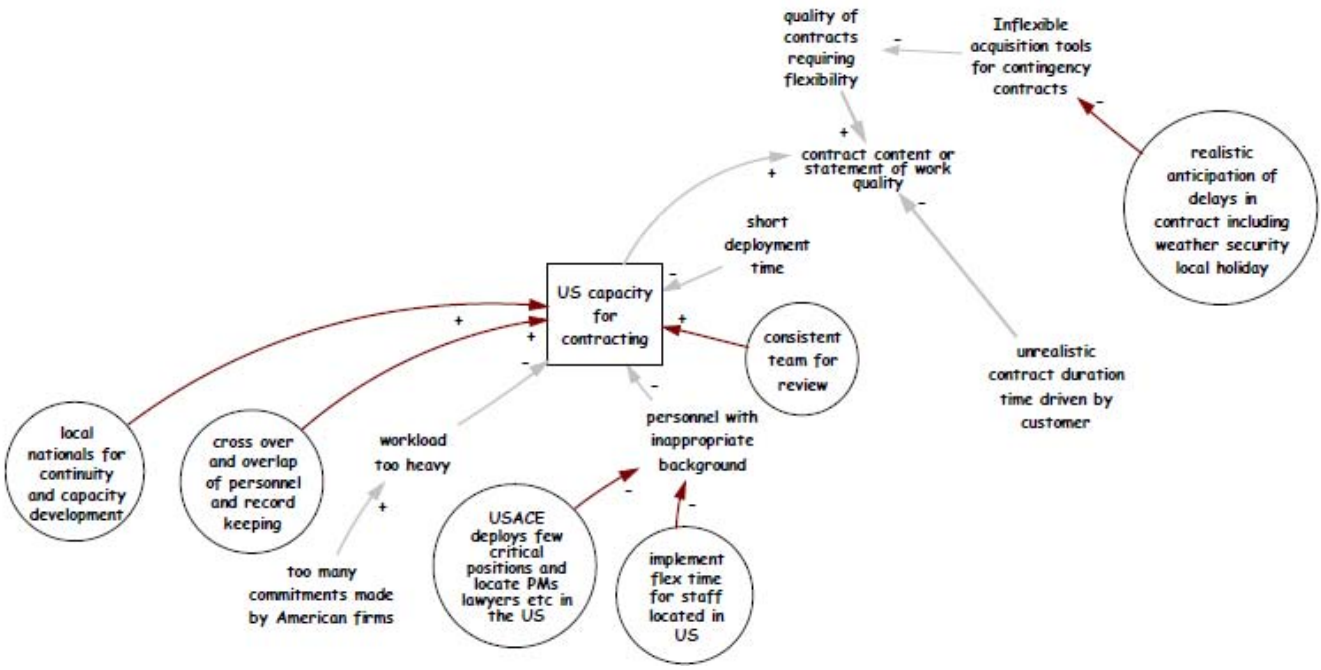
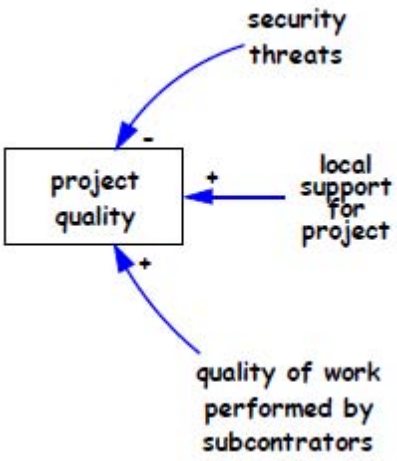
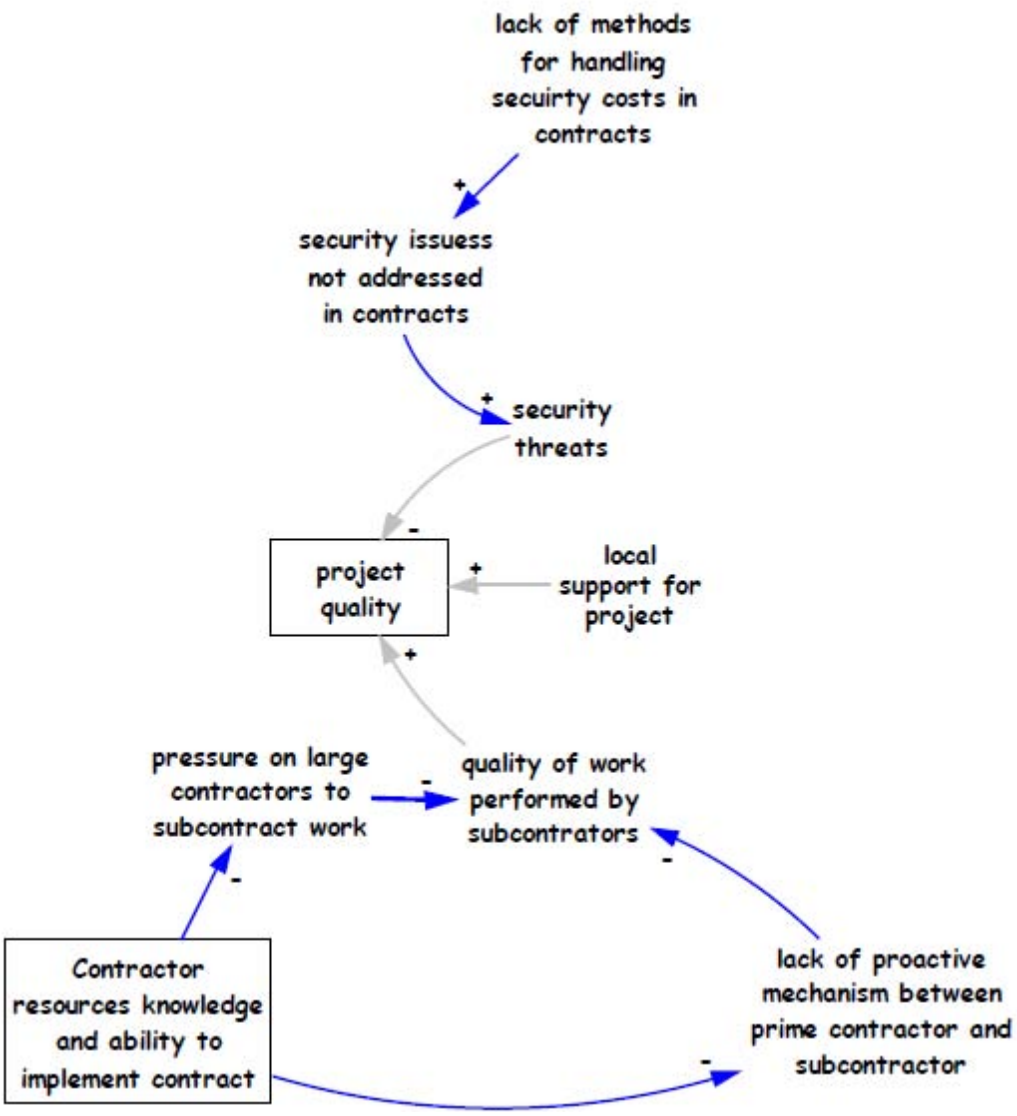
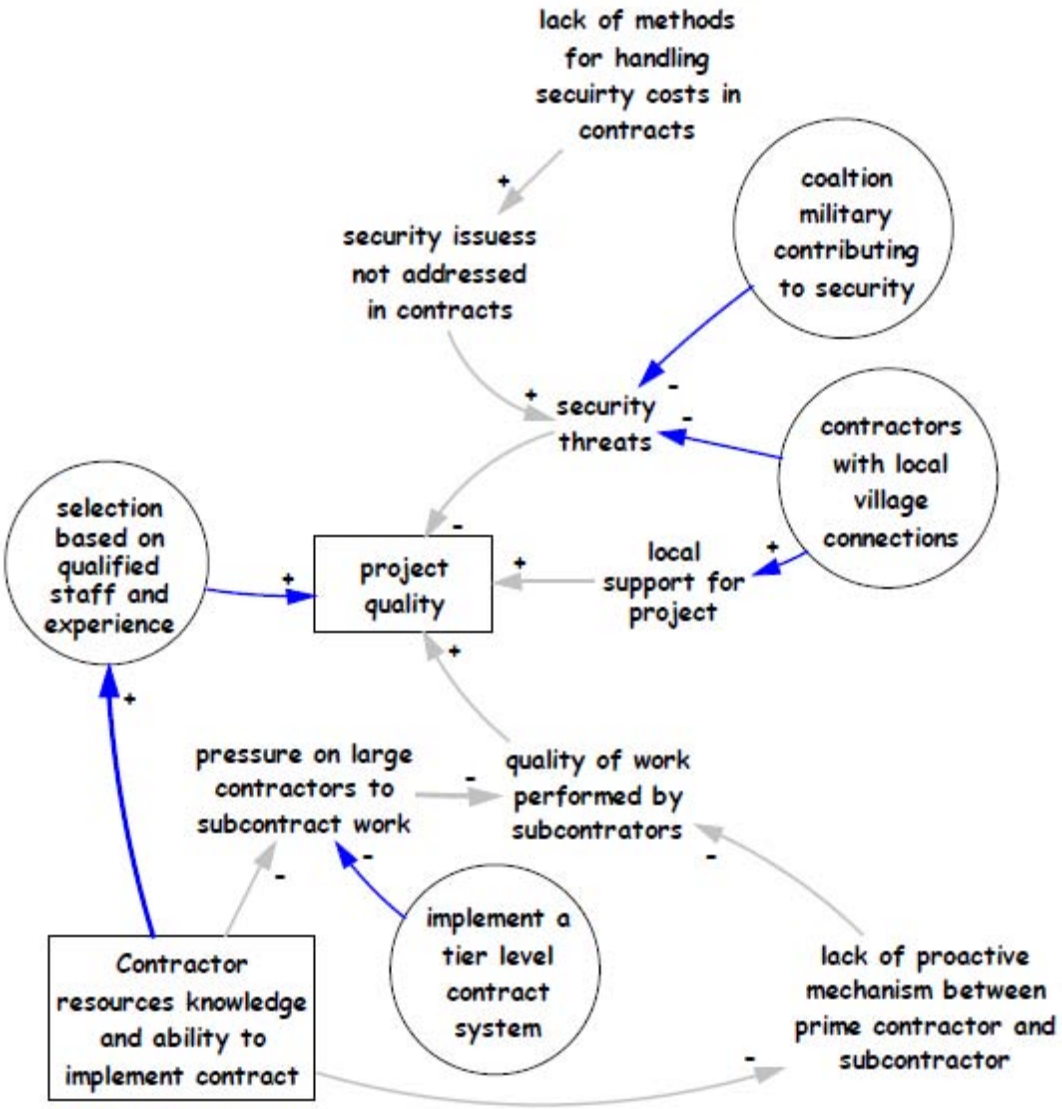
O and M contracting conducted by donors without local involvement
limited end user and local input for requirements in contract
USACE use in country engineering input
contracts not using engineering judgment and knowledge from in country
contract funding delays
contract content or statement of work quality
decisions made without input from in country feedback

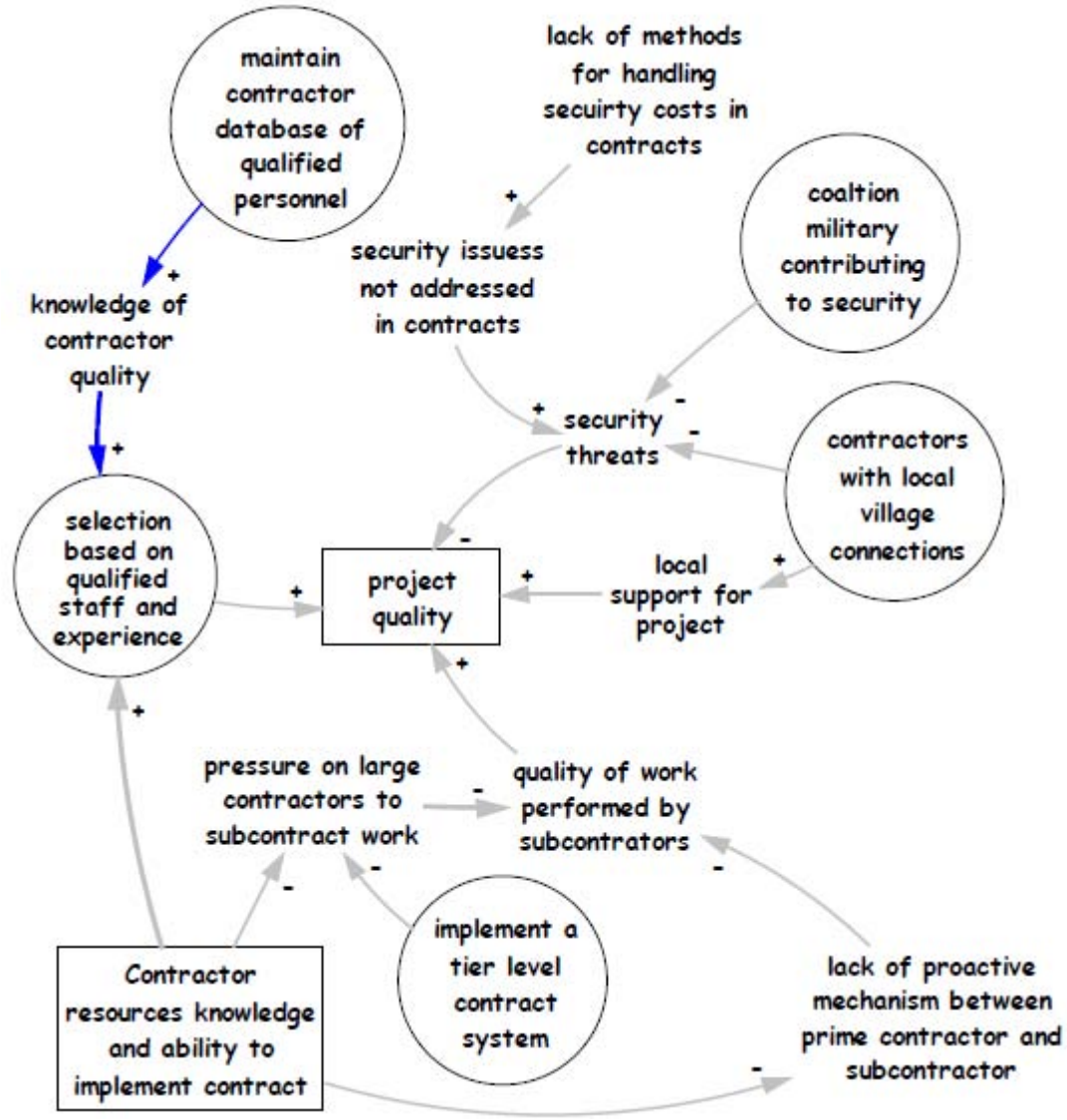

quality of contracts requiring flexibility
Inflexible acquisition tools for contingency contracts
contract content or statement of work quality
short deployment time
US capacity for contracting
unrealistic contract duration time driven by customer
personnel with inappropriate background
workload too heavy
too many commitments made by American firms


quality of contracts requiring flexibility
Inflexible acquisition tools for contingency contracts
realistic anticipation of delays in contract including weather security local holiday
contract content or statement of work quality
short deployment time
US capacity for contracting
consistent team for review
unrealistic contract duration time driven by customer
personnel with inappropriate background
local nationals for continuity and capacity development
cross over and overlap of personnel and record keeping
workload too heavy
too many commitments made by American firms
USACE deploys few critical positions and locate PMs lawyers etc in the US
implement flex time for staff located in US


security threats
project quality
local support for project
quality of work performed by subcontrators


lack of methods for handling secuirty costs in contracts
+
security issuess not addressed in contracts
+
security threats
-
project quality
+
local support for project
+
pressure on large contractors to subcontract work
-
quality of work performed by subcontrators
-
-
Contractor resources knowledge and ability to implement contract
lack of proactive mechanism between prime contractor and subcontractor
-


lack of methods for handling secuirty costs in contracts
security issuess not addressed in contracts
coaltion military contributing to security
security threats
contractors with local village connections
selection based on qualified staff and experience
project quality
local support for project
pressure on large contractors to subcontract work
quality of work performed by subcontrators
implement a tier level contract system
Contractor resources knowledge and ability to implement contract
lack of proactive mechanism between prime contractor and subcontractor


maintain contractor database of qualified personnel
lack of methods for handling secuirty costs in contracts
coaltion military contributing to security
security issuess not addressed in contracts
knowledge of contractor quality
security threats
contractors with local village connections
selection based on qualified staff and experience
project quality
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pressure on large contractors to subcontract work
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implement a tier level contract system
Contractor resources knowledge and ability to implement contract
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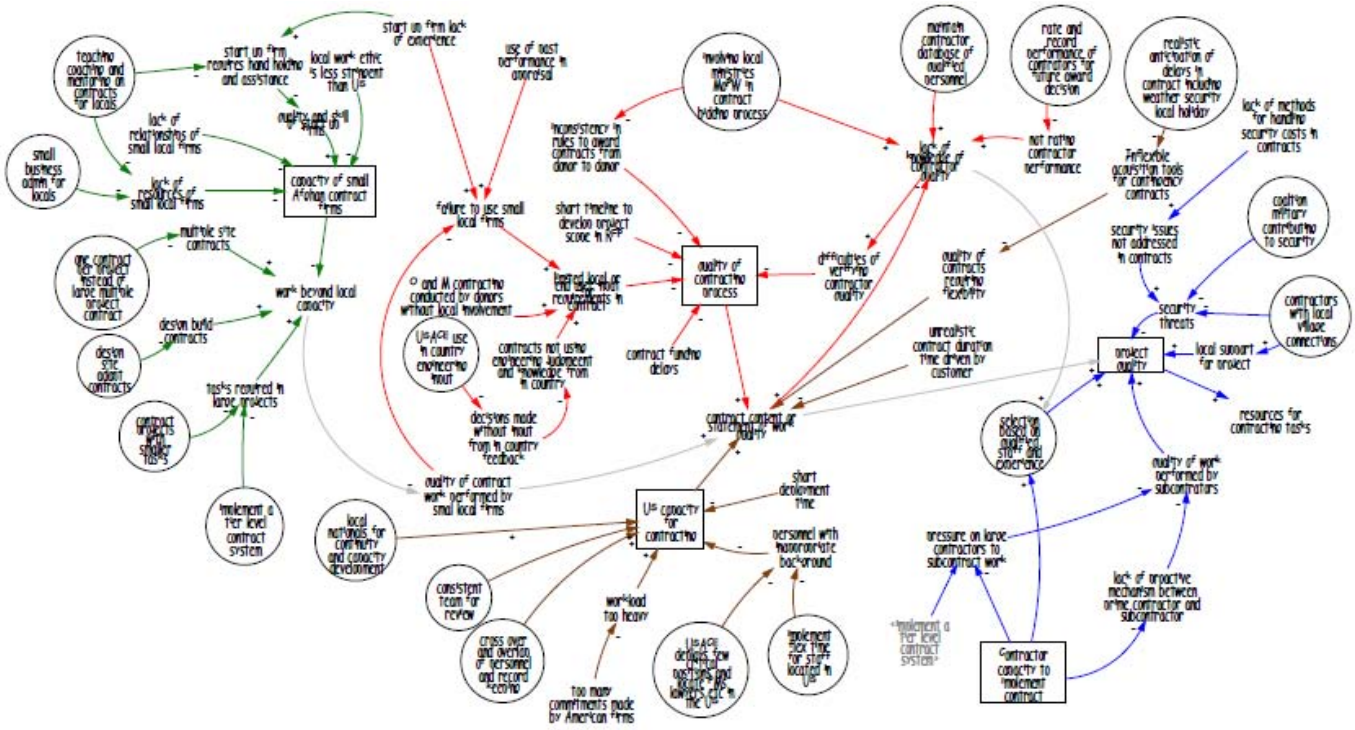
start up firm lack of experience
use of past performance in appraisal
involving local ministries MoPW in contract bidding process
maintain contractor database of qualified personnel
rate and record performance of contractors for future award decision
realistic anticipation of delays in contract including weather security local holiday
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lack of relationships of small local firms
small business admin for locals
lack of resources of small local firms
capacity of small Afghan contract firms
inconsistency in rules to award contracts from donor to donor
lack of knowledge of contractor quality
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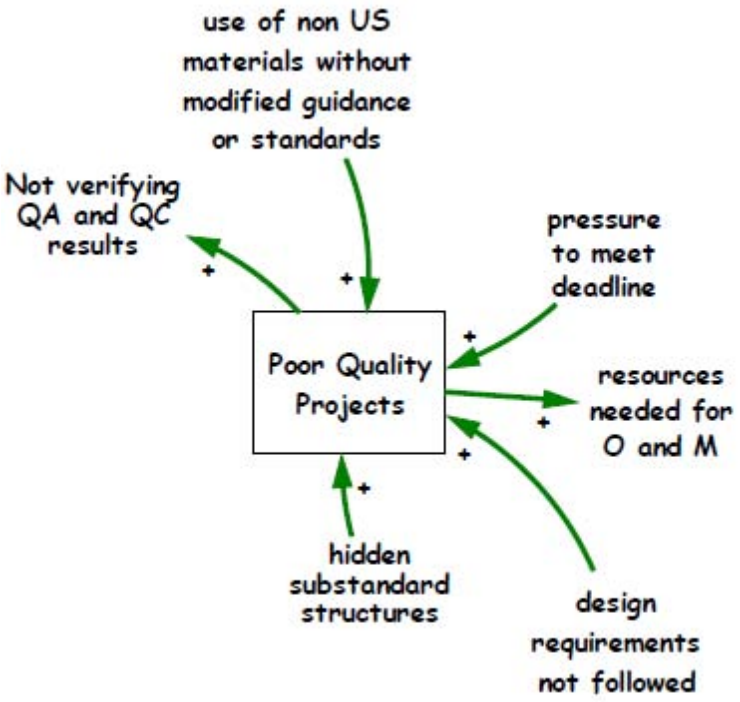
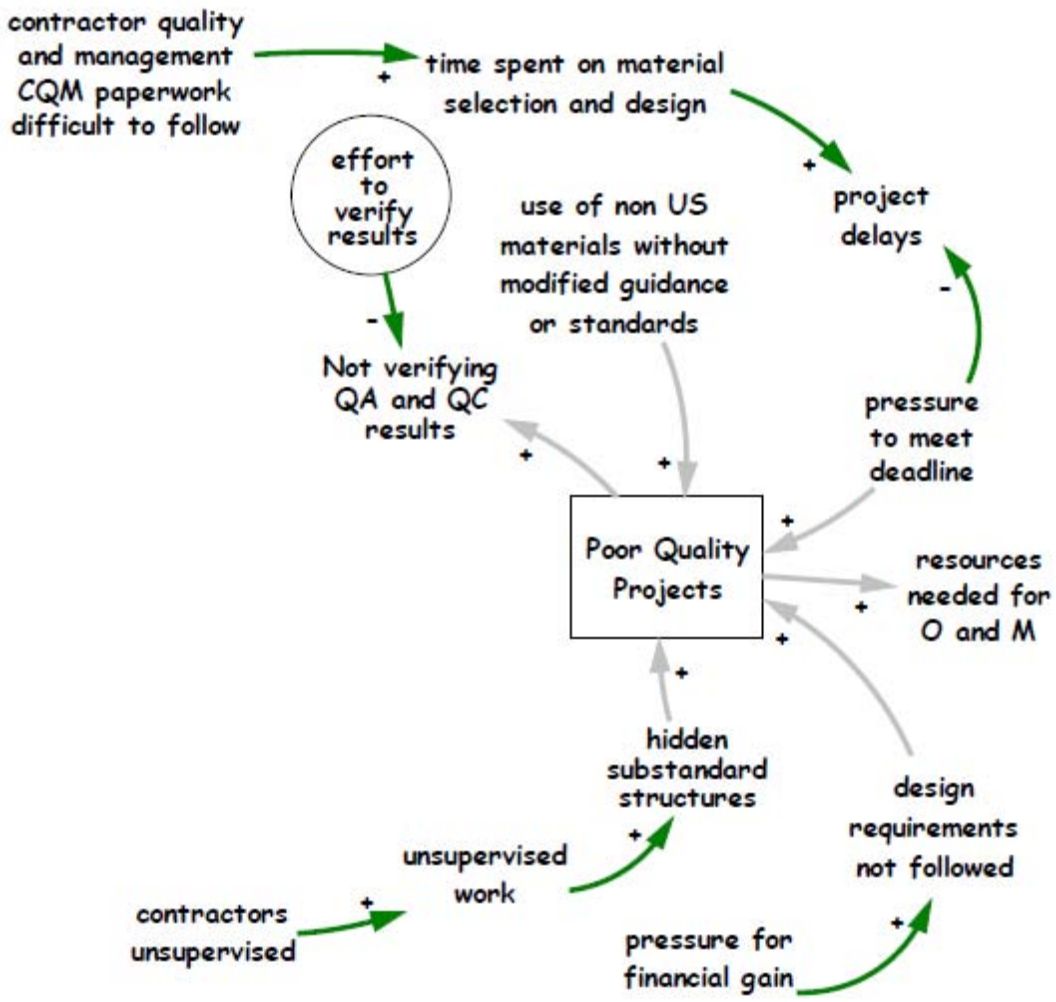
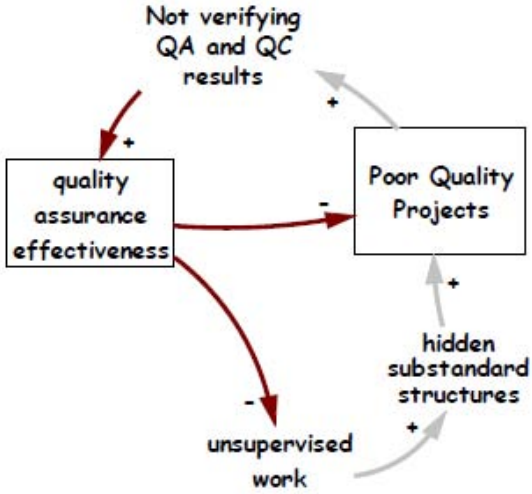
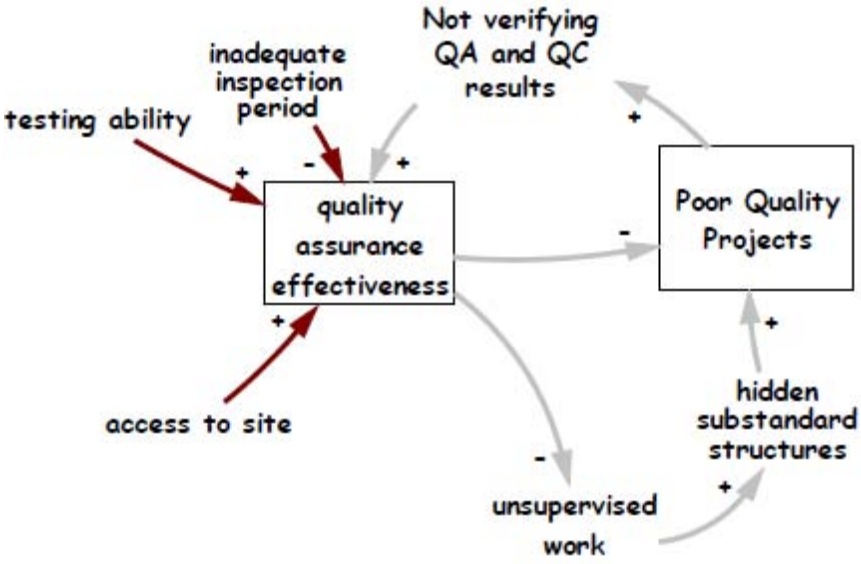
flexible acquisition tools for contingency contracts
failure to use small local firms
short timeline to develop project scope in RFP
difficulties of verifying contractor quality
quality of contracting process
security issues not addressed in contracts
coalition military contributing to security
multiple site contracts
one contract for project instead of large multiple project contract
work beyond local capacity
D and M contracting conducted by donors without local involvement
lack of local or end user involvement in contract
quality of contracts competing flexibility
design build contracts
design site award contracts
USACE use in country engineering input
contracts not using engineering judgement and knowledge from in country
contract funding delays
unrealistic contract duration time driven by customer
security threats
contractors with local village connections
project quality
local support for project
contract projects with smaller tasks
tasks required in large projects
decisions made without input from in country feedback
contract content or statement of work quality
selecting based on qualified staff and experience
resources for contracting tasks
quality of contract work performed by small local firms
short deployment time
US capacity for contracting
quality of work performed by subcontractors
local nationals for continuity and capacity development
personnel with appropriate background
consistent team for review
pressure on large contractors to subcontract work
implement a tier level contract system
lack of proactive mechanism between prime contractor and subcontractor
cross over and overlap of personnel and record keeping
work load too heavy
too many commitments made by American firms
USACE delays, new internal restrictions and issues with knowledge etc in the US
implement rest time for staff located in US
Contractor capacity to implement contract

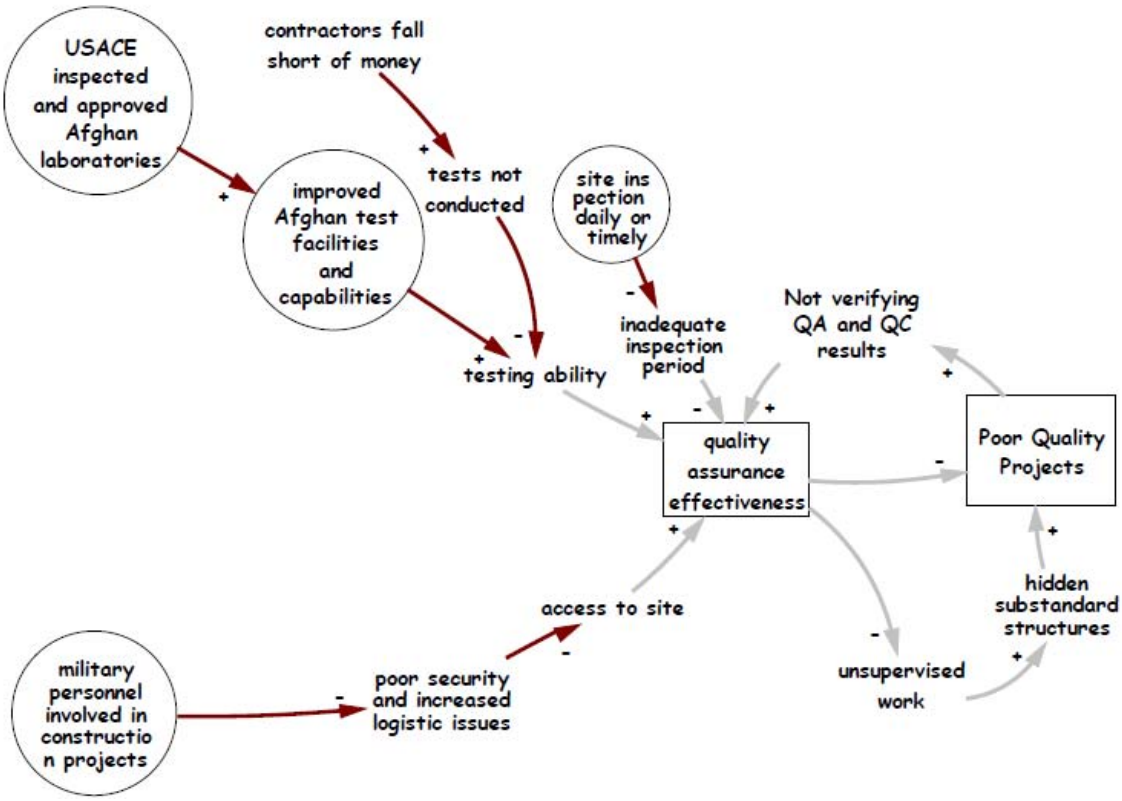
Quality Assurance/Quality Control

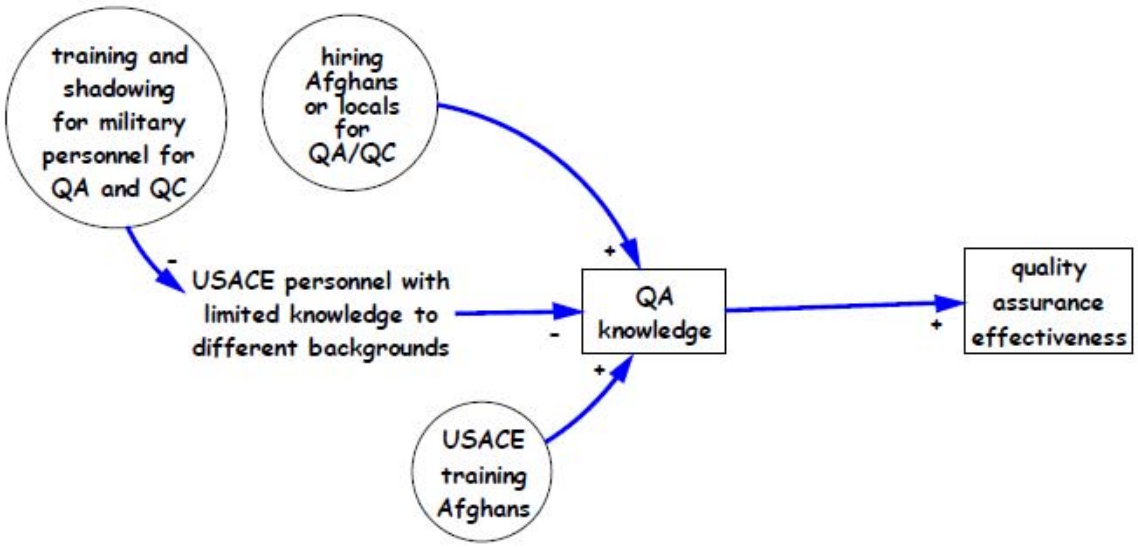


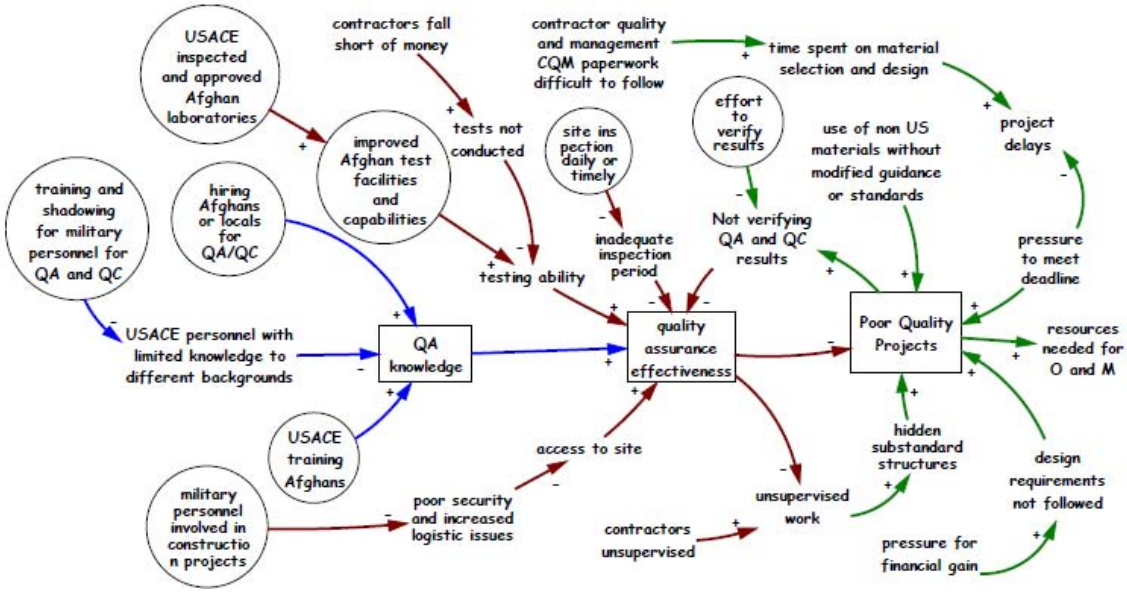

contractor quality and management CQM paperwork difficult to follow
time spent on material selection and design
effort to verify results
use of non US materials without modified guidance or standards
project delays
Not verifying QA and QC results
pressure to meet deadline
Poor Quality Projects
resources needed for O and M
hidden substandard structures
design requirements not followed
unsupervised work
contractors unsupervised
pressure for financial gain


Not verifying QA and QC results
quality assurance effectiveness
Poor Quality Projects
hidden substandard structures
unsupervised work


Not verifying QA and QC results
inadequate inspection period
testing ability
quality assurance effectiveness
Poor Quality Projects
access to site
hidden substandard structures
unsupervised work


USACE inspected and approved Afghan laboratories
contractors fall short of money
improved Afghan test facilities and capabilities
tests not conducted
site ins pection daily or timely
inadequate inspection period
Not verifying QA and QC results
testing ability
quality assurance effectiveness
Poor Quality Projects
access to site
hidden substandard structures
military personnel involved in constructio n projects
poor security and increased logistic issues
unsupervised work


training and shadowing for military personnel for QA and QC
hiring Afghans or locals for QA/QC
USACE personnel with limited knowledge to different backgrounds
QA knowledge
quality assurance effectiveness
USACE training Afghans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effort to verify results
use of non US materials without modified guidance or standards
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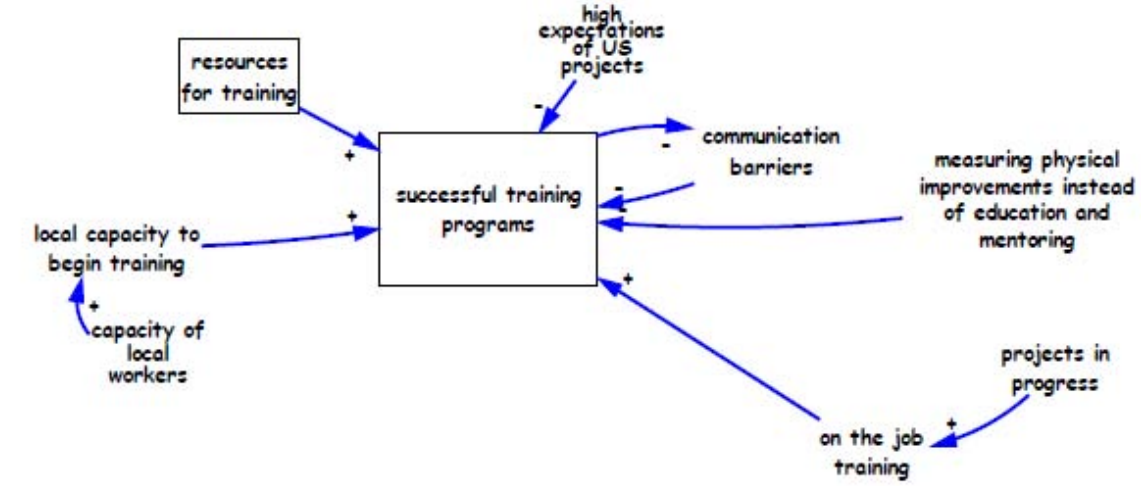
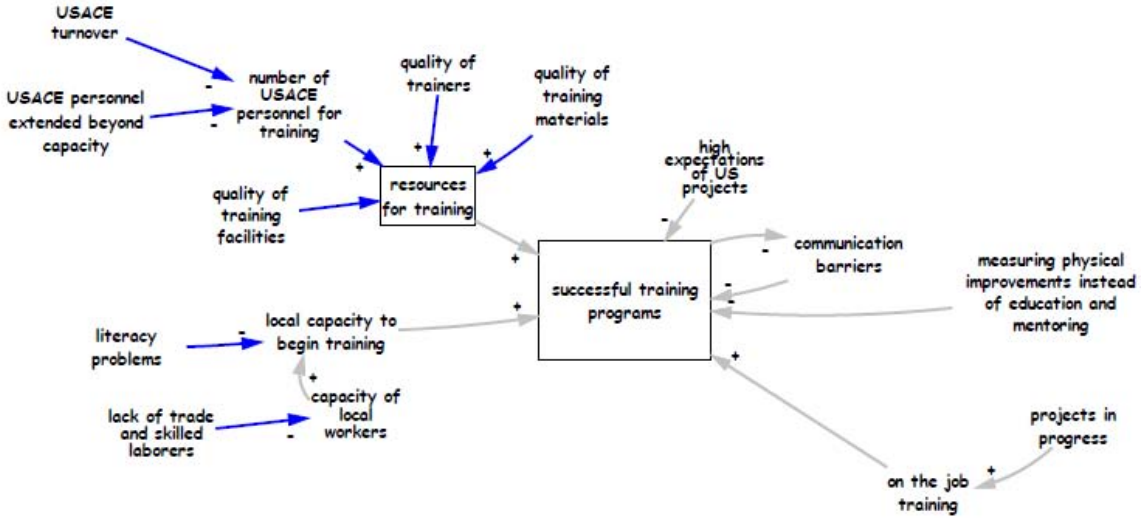
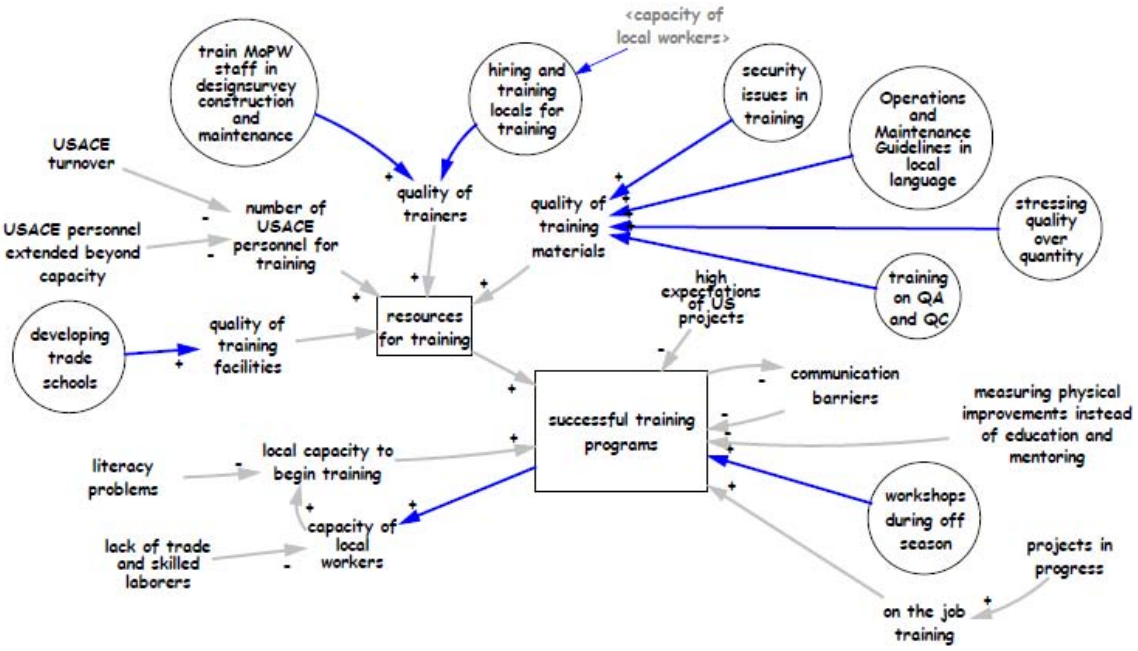
training and shadowing for military personnel for QA and QC
hiring Afghans or locals for QA/QC
Not verifying QA and QC results
pressure to meet deadline
inadequate inspection period
testing ability
USACE personnel with limited knowledge to different backgrounds
QA knowledge
quality assurance effectiveness
Poor Quality Projects
resources needed for O and M
USACE training Afghans
access to site
hidden substandard structures
design requirements not followed
military personnel involved in constructio n projects
poor security and increased logistic issues
unsupervised work
contractors unsupervised
pressure for financial gain

Education


resources for training
high expectations of US projects
communication barriers
measuring physical improvements instead of education and mentoring
successful training programs
local capacity to begin training
capacity of local workers
projects in progress
on the job training


USACE turnover
USACE personnel extended beyond capacity
number of USACE personnel for training
quality of trainers
quality of training materials
quality of training facilities
resources for training
high expectations of US projects
communication barriers
measuring physical improvements instead of education and mentoring
successful training programs
literacy problems
local capacity to begin training
capacity of local workers
lack of trade and skilled laborers
projects in progress
on the job training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security issues in training
Operations and Maintenance Guidelines in local language
stressing quality over quantity
training on QA and QC
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USACE personnel extended beyond capacity
number of USACE personnel for training
quality of trainers
quality of training materials
resources for training
high expectations of US projects
developing trade schools
quality of training facilities
communication barriers
measuring physical improvements instead of education and mentoring
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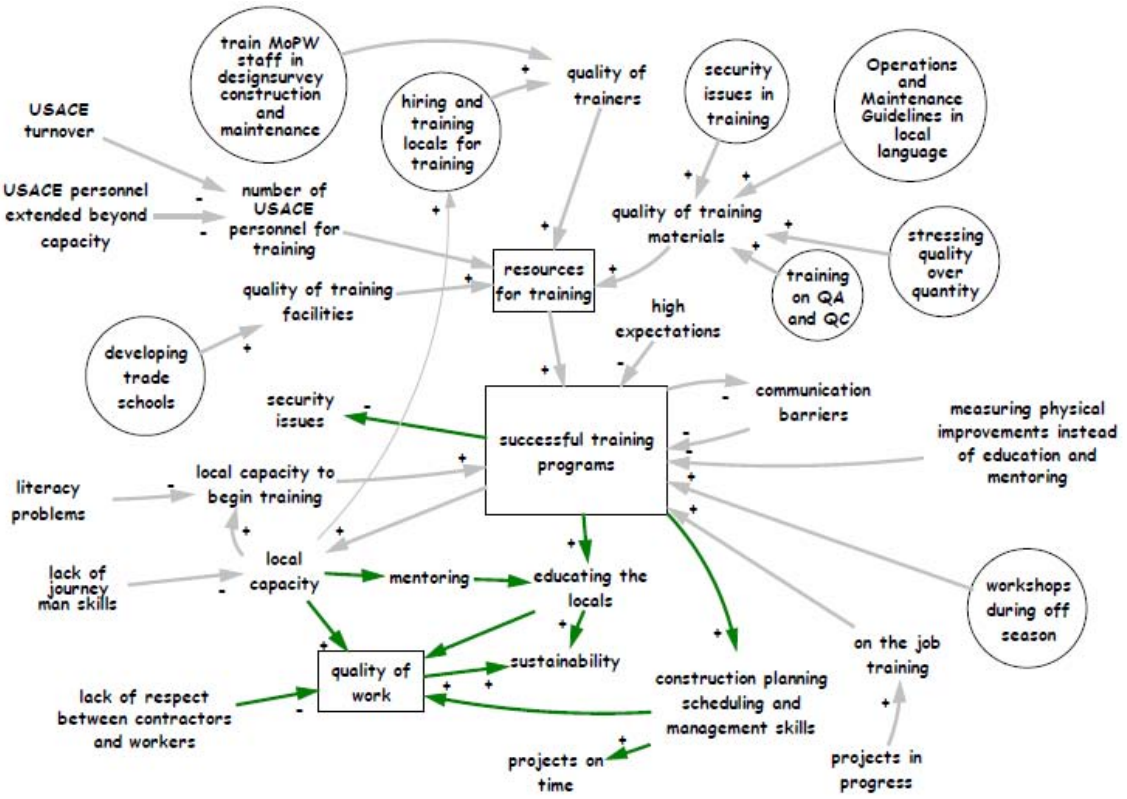
local capacity to begin training
capacity of local workers
lack of trade and skilled laborers
workshops during off season
projects in progress
on the job training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quality of training facilities
high expectations
developing trade schools
security issues
communication barriers
measuring physical improvements instead of education and mentoring
successful training programs
literacy problems
local capacity to begin training
local capacity
lack of journey man skills
mentoring
educating the locals
workshops during off season
quality of work
sustainability
on the job training
lack of respect between contractors and workers
construction planning scheduling and management skills
projects on time
projects in progress

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13. SUPPLEMENTARY NOTES

14. ABSTRACT

The U.S. military including civilian engineering and construction personnel have deployed and redeployed since the reconstruction effort began in Afghanistan. Issues with discontinuity of information occur as staff departs and new staff is assigned to the job. A significant amount of knowledge and experience accumulates and this wealth of information must be gathered for in-theater best practices. Documentations of lessons learned and experiences can be disseminated to provide insight for incoming staff, used to implement in planning processes for projects, and to avoid or minimize unintended consequences. Experiences and lessons learned from construction projects in Afghanistan were collected from professionals, contractors, and donors, providing insight and knowledge of programming and contracting awards, planning and site assessments, designing and construction, selecting materials, ensuring quality control and quality assurance, training and education, and doing maintenance on and operation of infrastructure. The data were summarized qualitatively and analyzed quantitatively into phrases to reflect the description of each input for problems and solutions using frequency analysis, sector diagrams, and causal maps. The responses conveyed stories telling how problems and solutions are linked. A specific solution may not only work for the original target problem but may have a secondary positive impact on another problem in the chain of issues. The data emphasized security problems during construction (i.e., stealing materials), and delays caused by security and attacks during design and construction phases. Another major problem was not accounting climatic (weather) conditions that affected design and construction. The Afghan engineers and practitioners have echoed similar concerns. In addition, the local nationals (LNs) raised the issue that there currently are no standards and criteria for imported materials, which directly affect the quality of materials being used in construction. The quality of material used varied dramatically, and negatively affected the outcome of construction projects.

15. SUBJECT TERMS

Afghanistan
Contracting
Cultural
Design and construction
Education
Lessons learned
Materials
Operation and maintenance

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14. ABSTRACT (cont'd)

Solutions have been highlighted to address: 1) the process as top priority; 2) sustainability, reflected in the capacity to develop infrastructure that the local government can maintain and operate, implementing practical standards for the end-users, and local economics, affecting current and future infrastructure development; 3) coordination among U.S., international, Afghan government and local entities; 4) and active improvement of local expertise. This is a fact-finding report on construction challenges in Afghanistan, based on the experience and knowledge of engineers and construction personnel, contractors, and donor staff for various projects. There is a vast amount of information in this report highlighting significant ways to minimize unintended consequences. The construction challenges in Afghanistan are multi-dimensional and dynamic because of security and local capacity dilemmas, and because of a lack of understanding of the local culture. However, this report suggests 1) considering cultural sensitivity and attaining buy-in, and 2) developing the technical competency of the local workforce to improve construction and developing an engineering education capability by partnering with local universities. These will enhance and improve knowledge, ownership, sustainability of facilities and infrastructure, influencing both current and long-term development. Therefore, these will promote the country's security. In addition, there several other mechanisms that should be established based on the development of this study for specific applications: 1) generating scenarios before actual facilities are planned to assess the site conditions and material influence; 2) examining the uncertainty and risks with varying criteria; 3) quantifying the performance of infrastructure using adaptable construction guidelines; and 4) assessing the impact of country or regional stability and sustainment. All of these mechanisms are essential for planning and development.

15. SUBJECT TERMS (cont'd)

O & M
Planning and site assessments
Process
QA/OC
Security
Solutions
Training